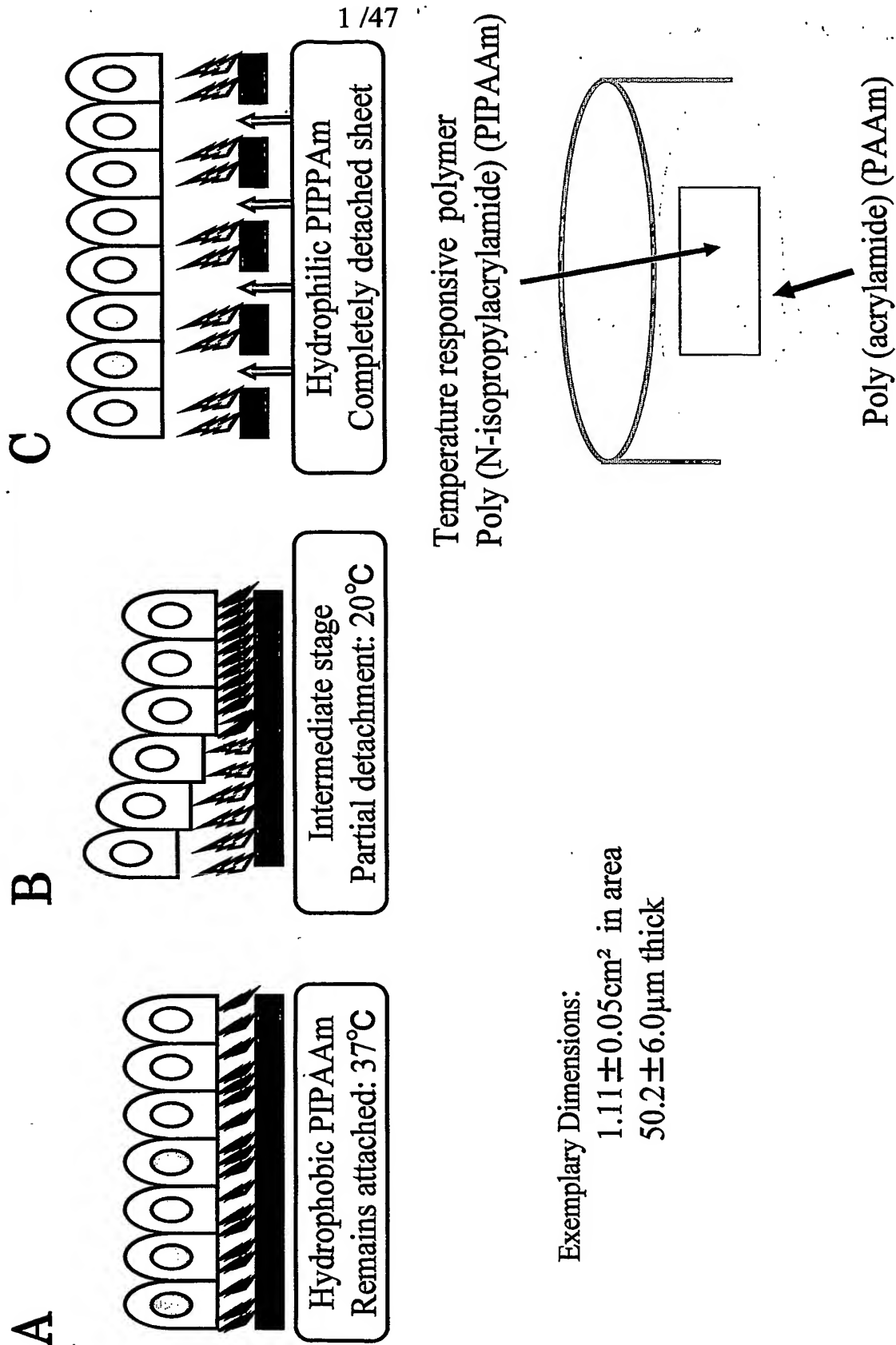


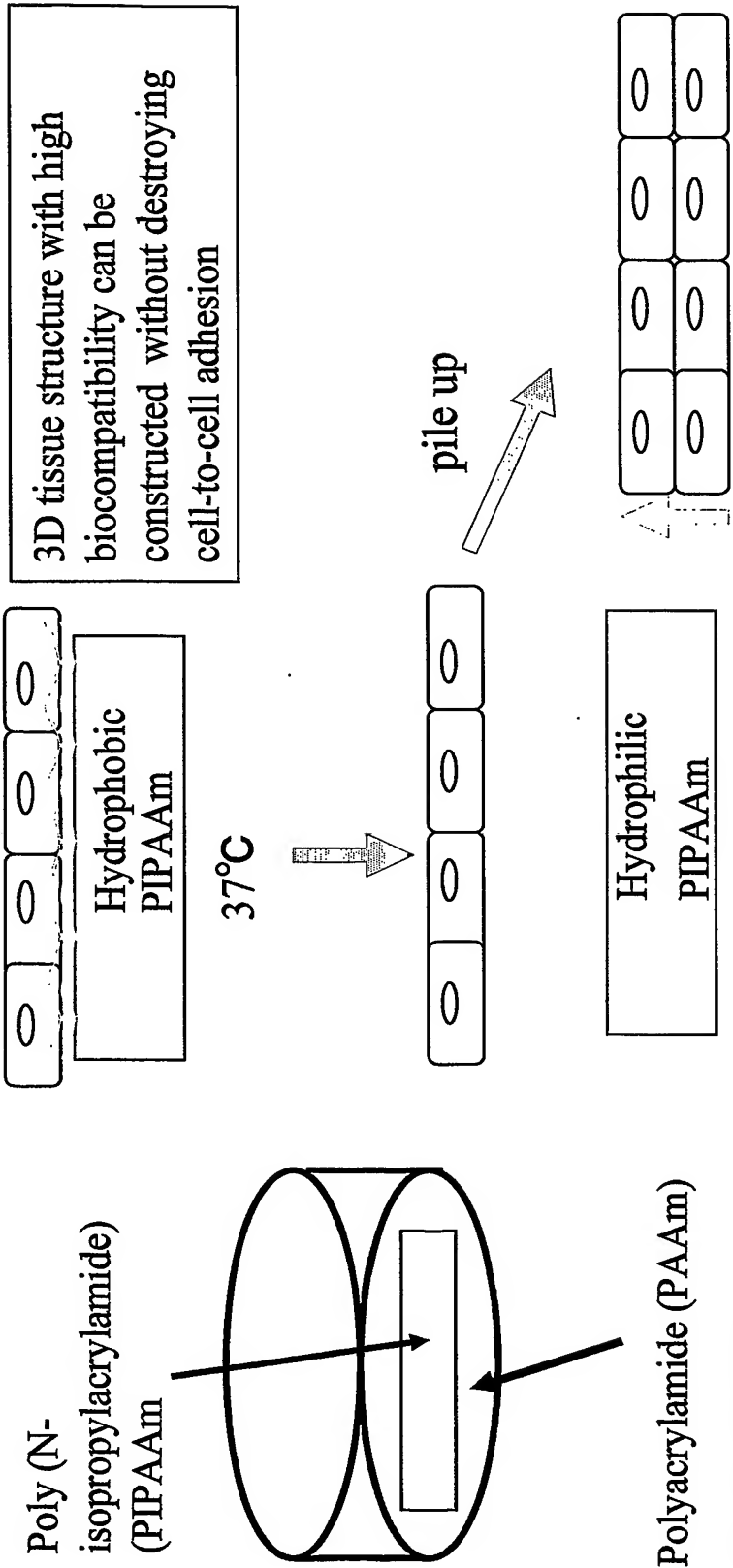
Cell Sheet Constructs

FIG. 1A

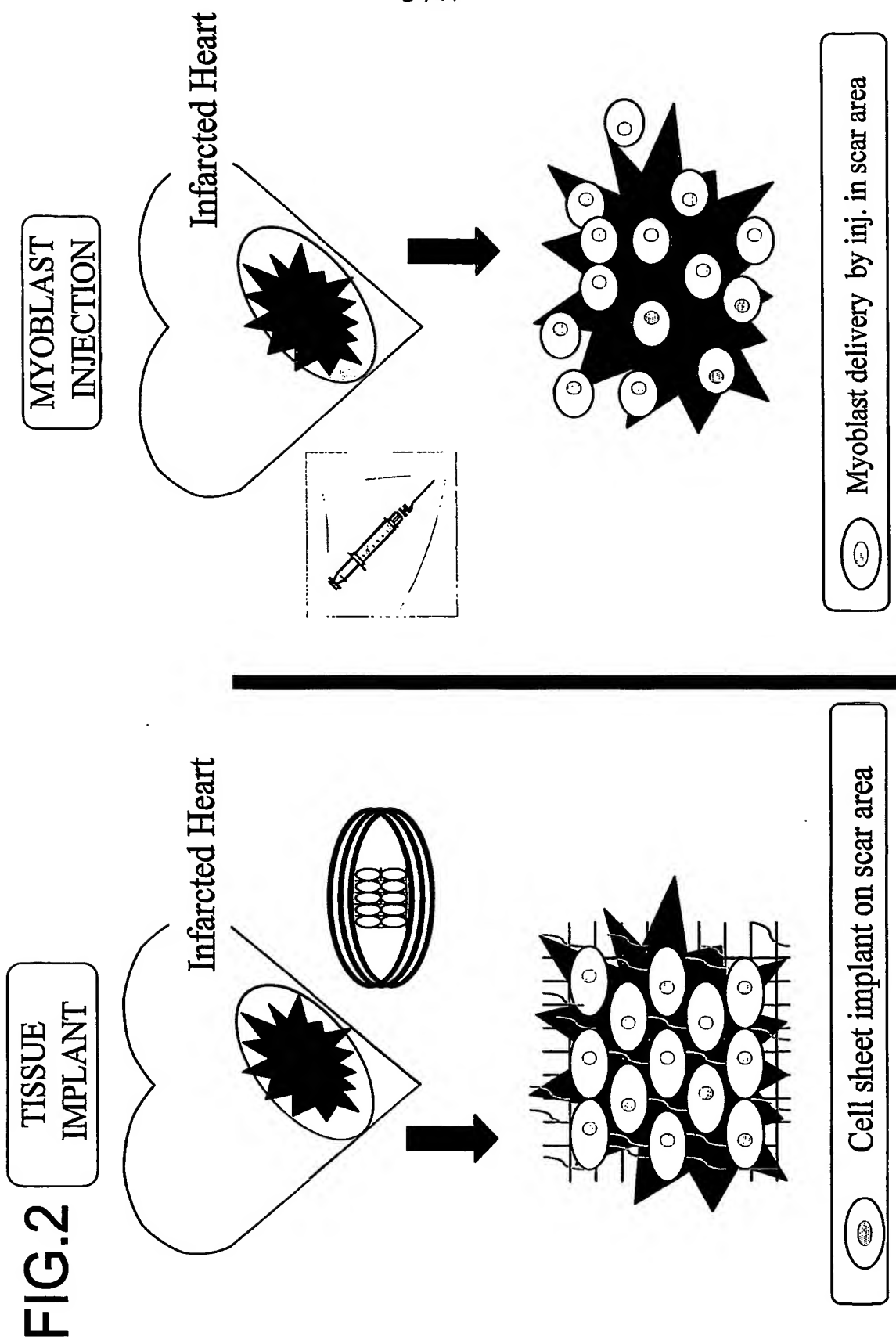


Temperature responsive culture dish

FIG.1B

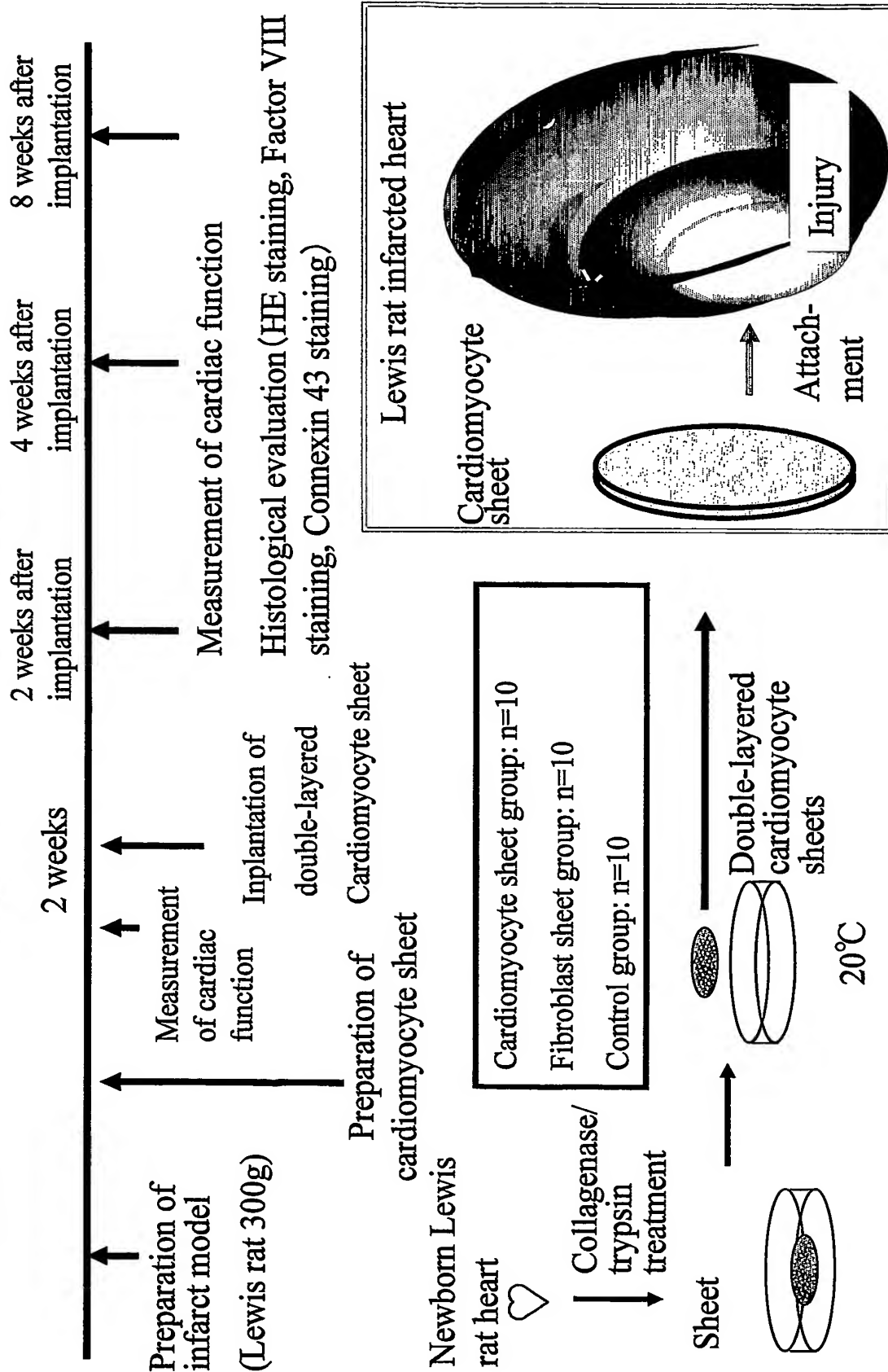


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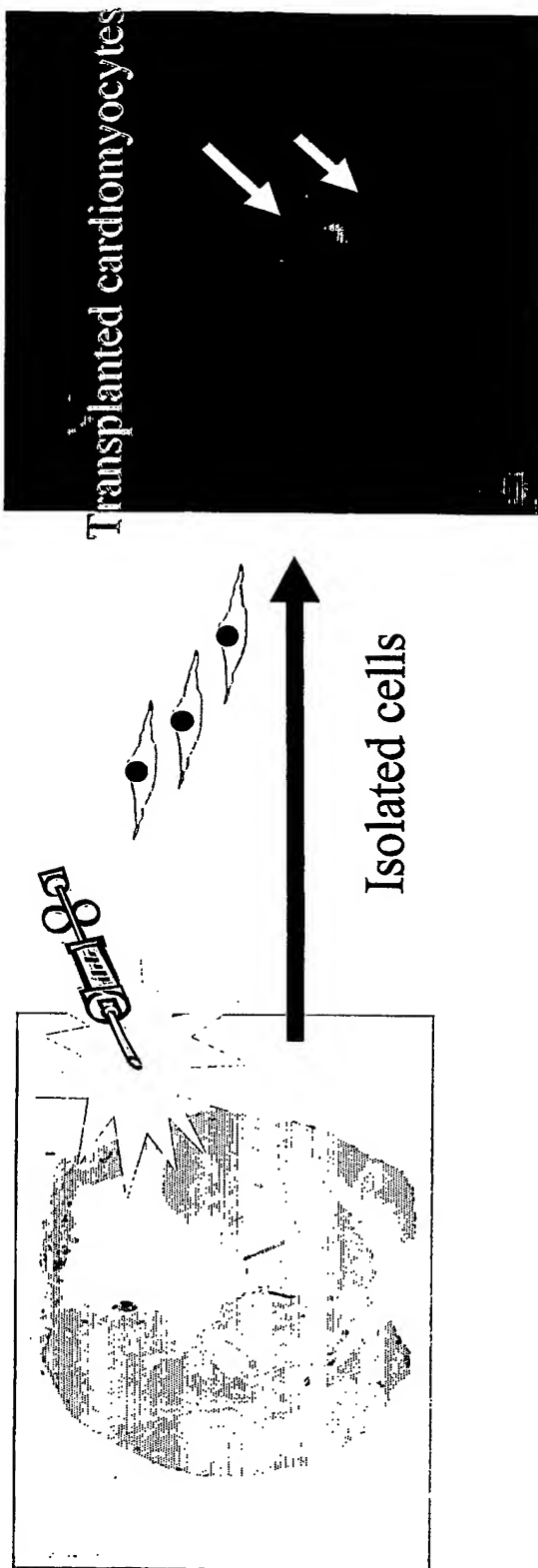
Experimental Protocol

3. GEF



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FIG.4 Regenerative therapy for cardiac
muscle by cell transplantation



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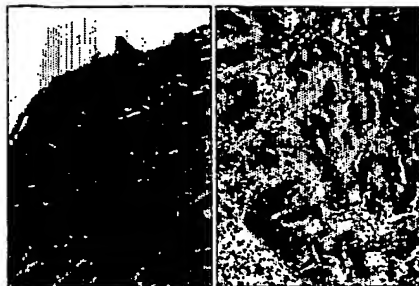
FIG.5 Problems with tissue transplantation

Cardiac muscle graft with scaffold

Alignment and cell-to-cell adhesion of transplanted cells within scaffold

Changes in scaffold in organism : elicitation of inflammation

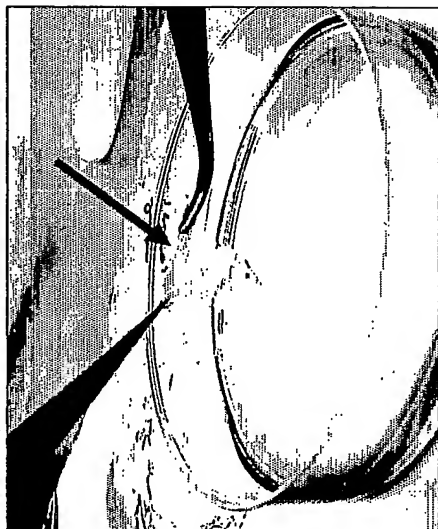
Acceptance of scaffold by recipient's heart



Development of high biocompatible cardiac muscle graft without scaffold

FIG.6

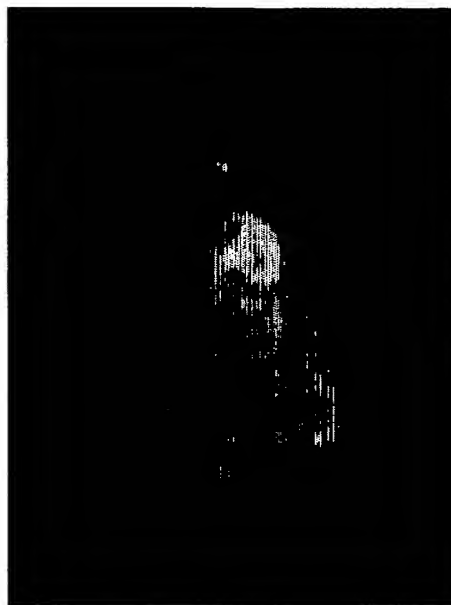
Implantation of cardiomyocyte sheet into infarcted heart



Cardiomyocyte sheet

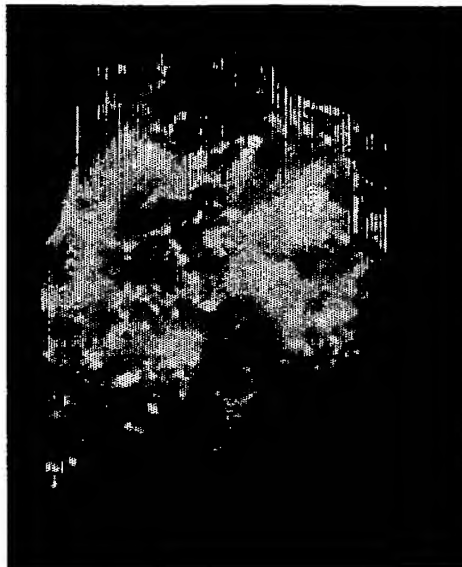


Implantation into rat infarct model

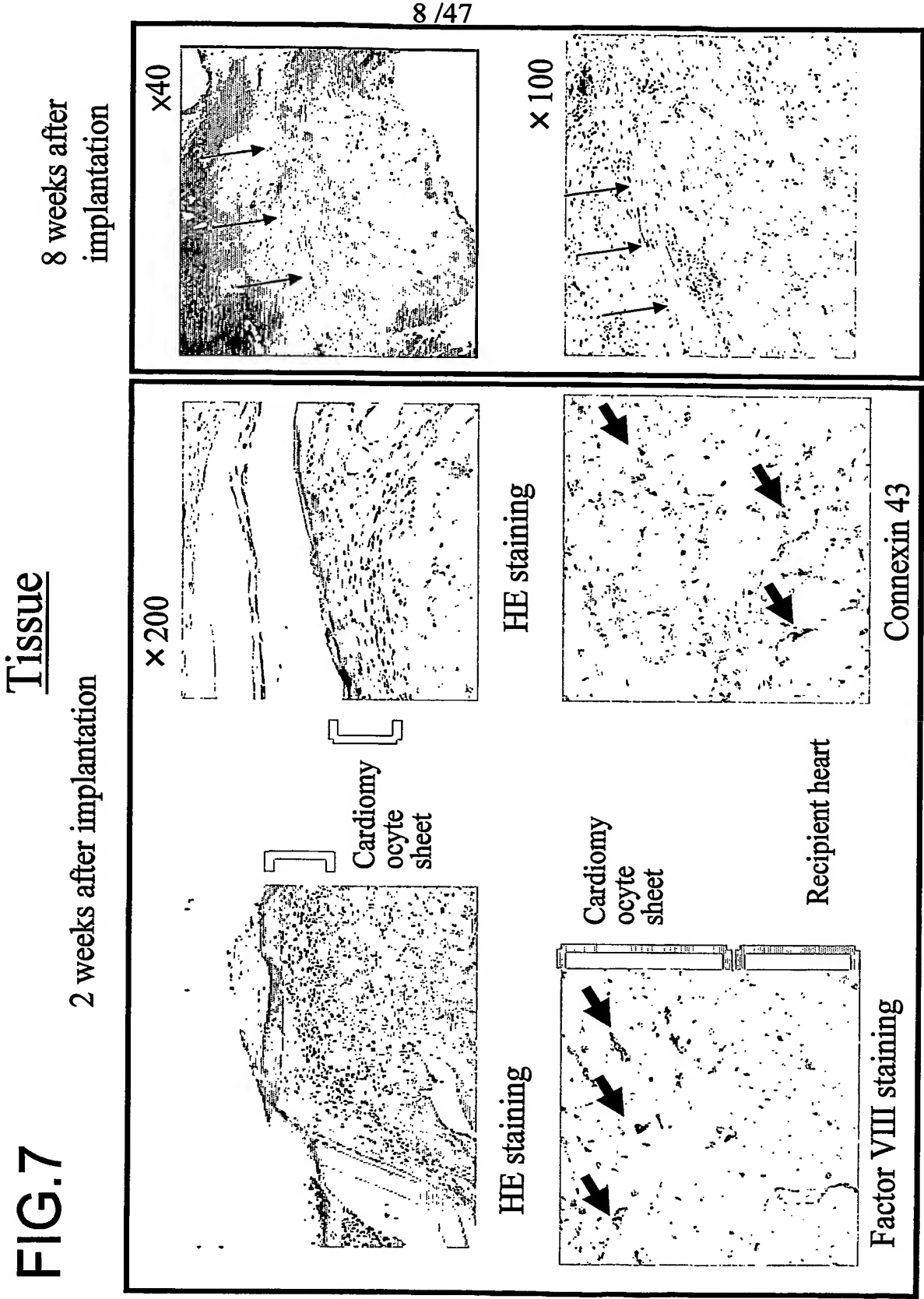


In vitro

Implantation of GFP rat newborn cardiomyocyte sheet



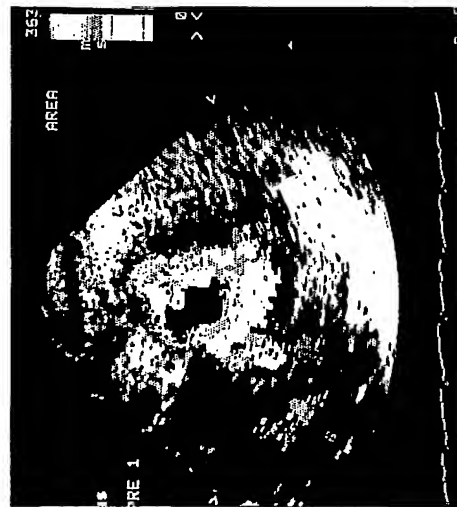
In vivo



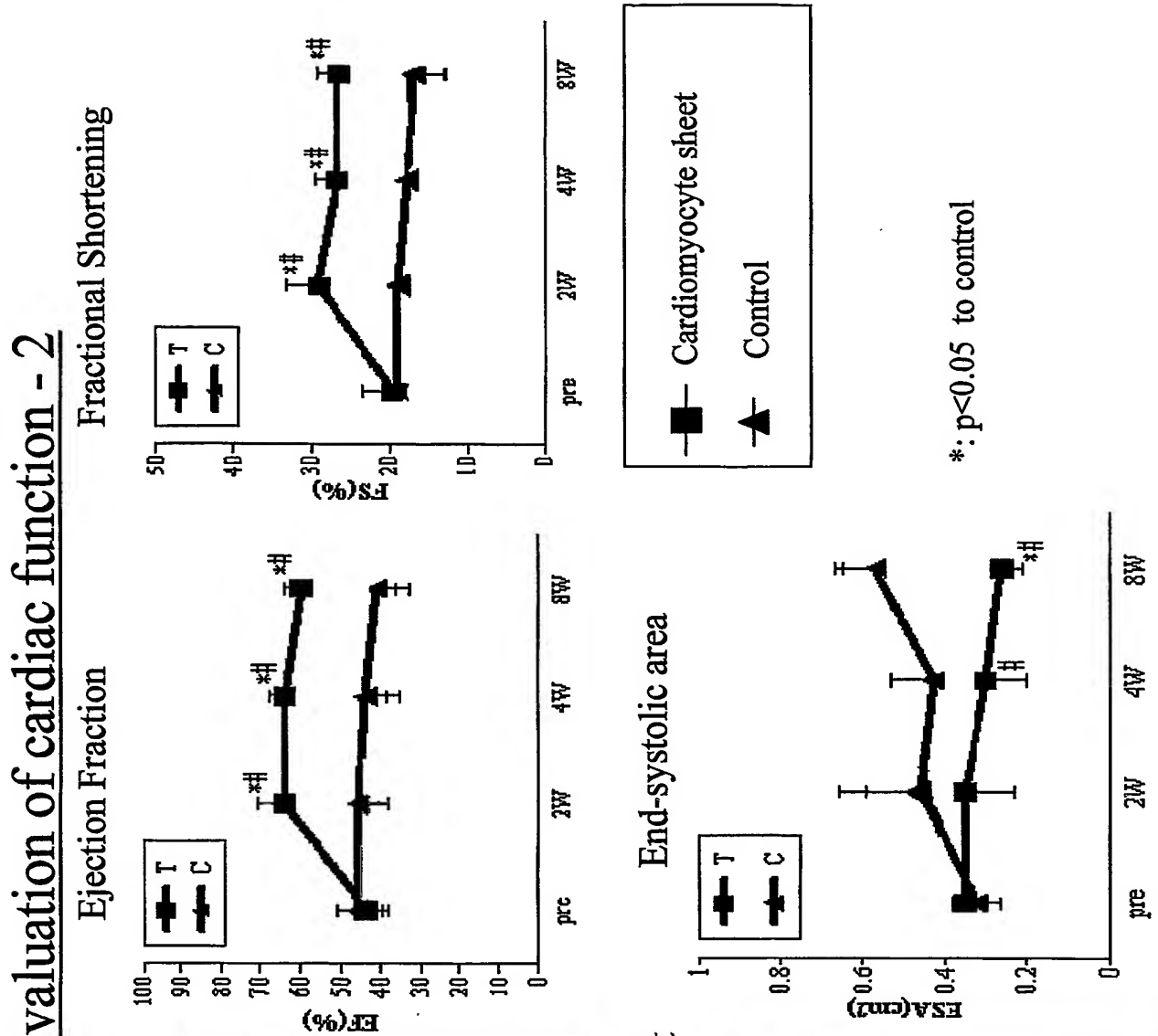
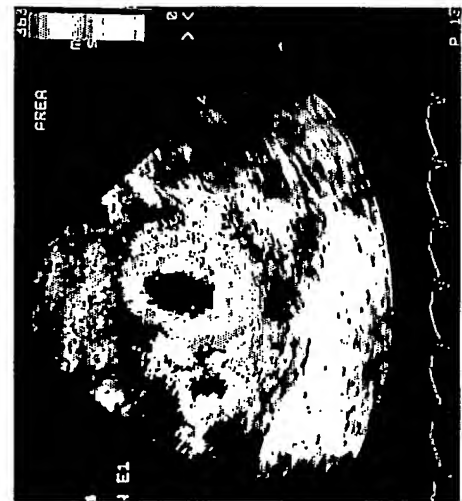
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FIG.9

Base line

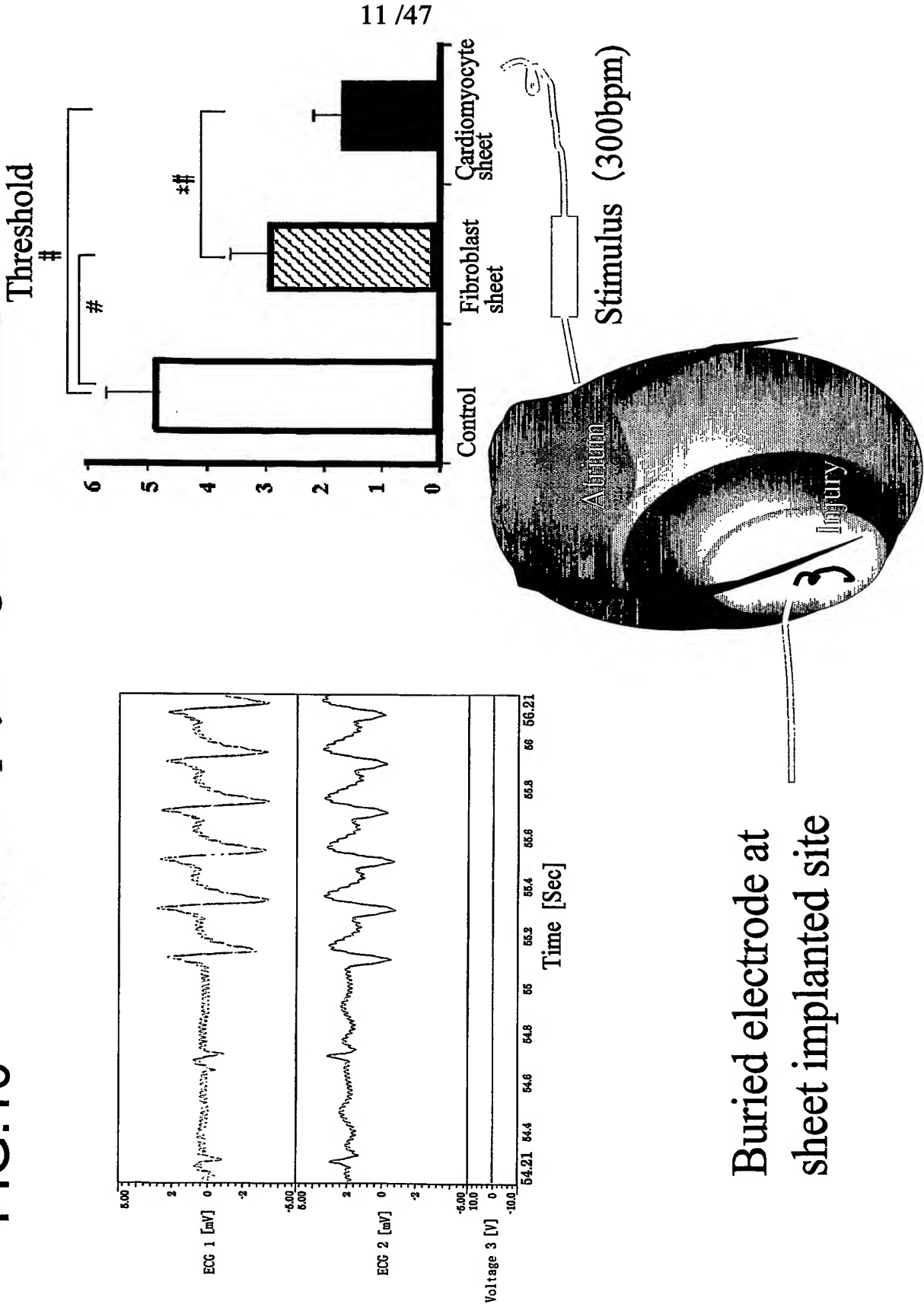


Implanted cardiomyocyte sheet



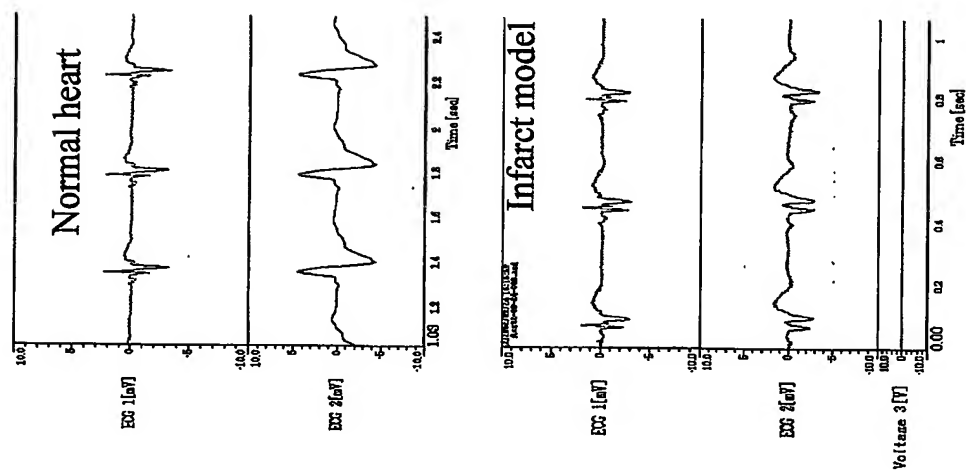
Electrophysiological Evaluation

FIG.10



Buried electrode at
sheet implanted site

FIG.11



ECG 1:ECG (Surface)

ECG 2: Normal heart (anterior wall)

Ligation model (injured)

Prosthetic tissue implanted

(prosthetic tissue injured)

Electrophysiological Evaluation

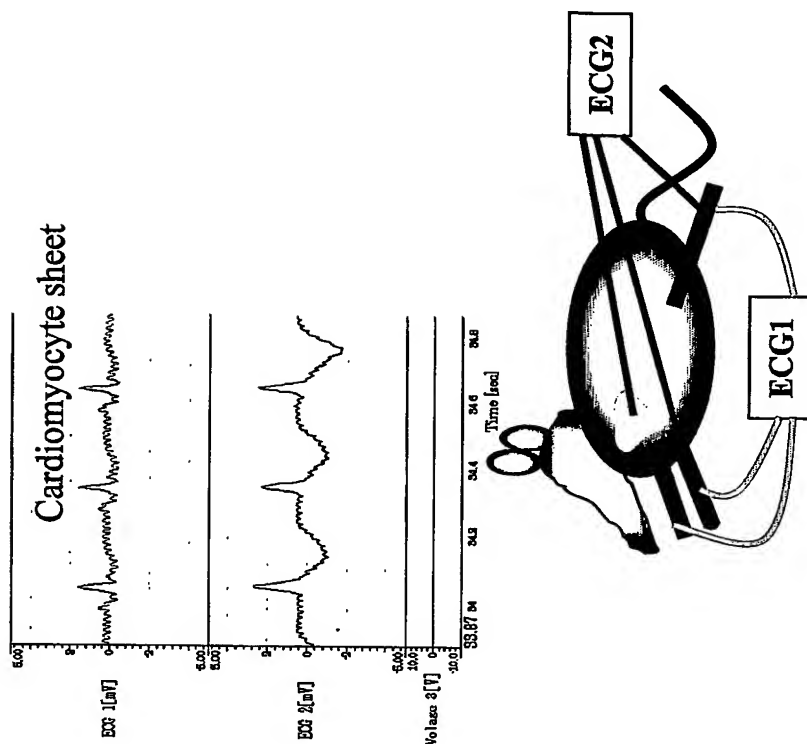
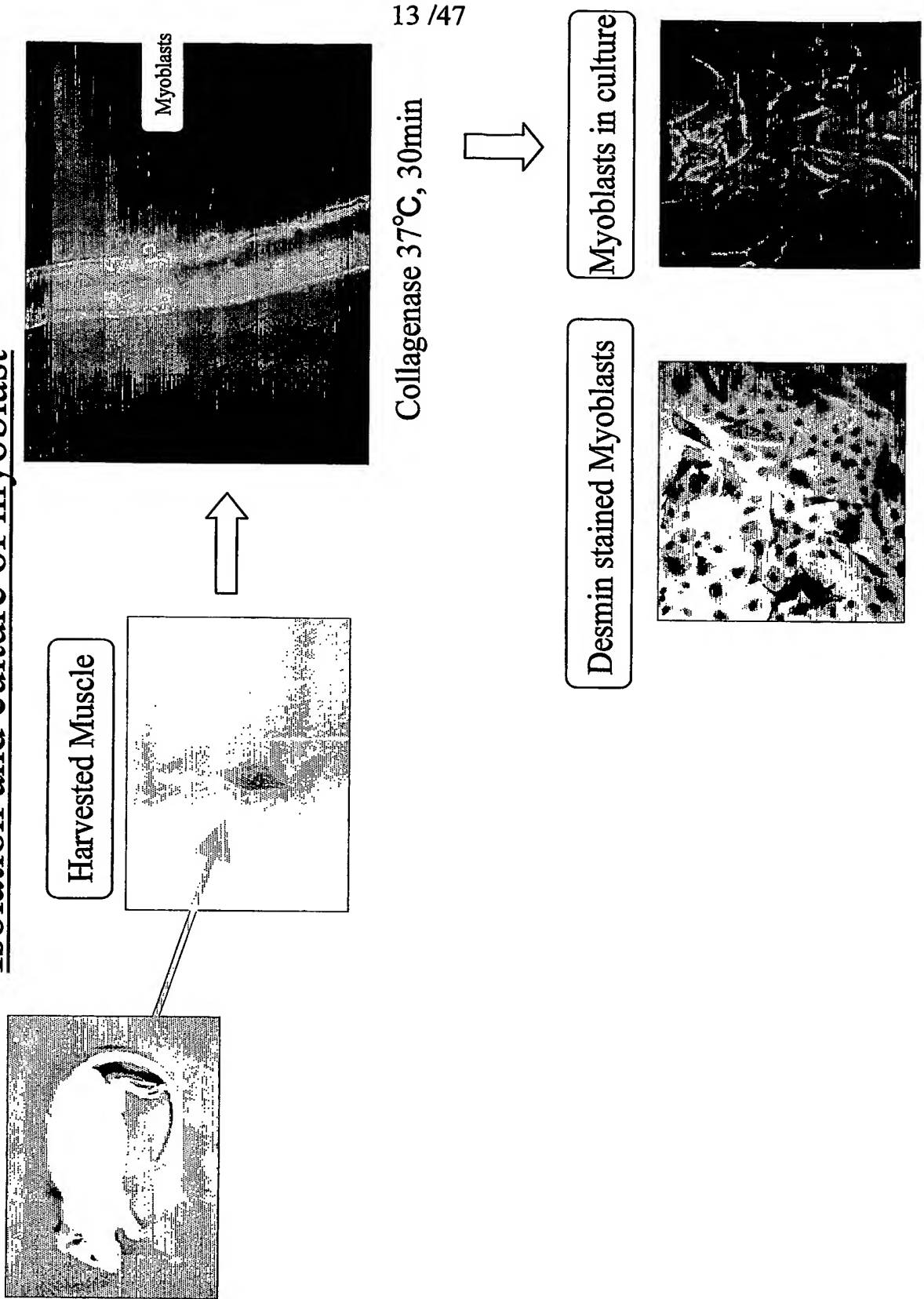


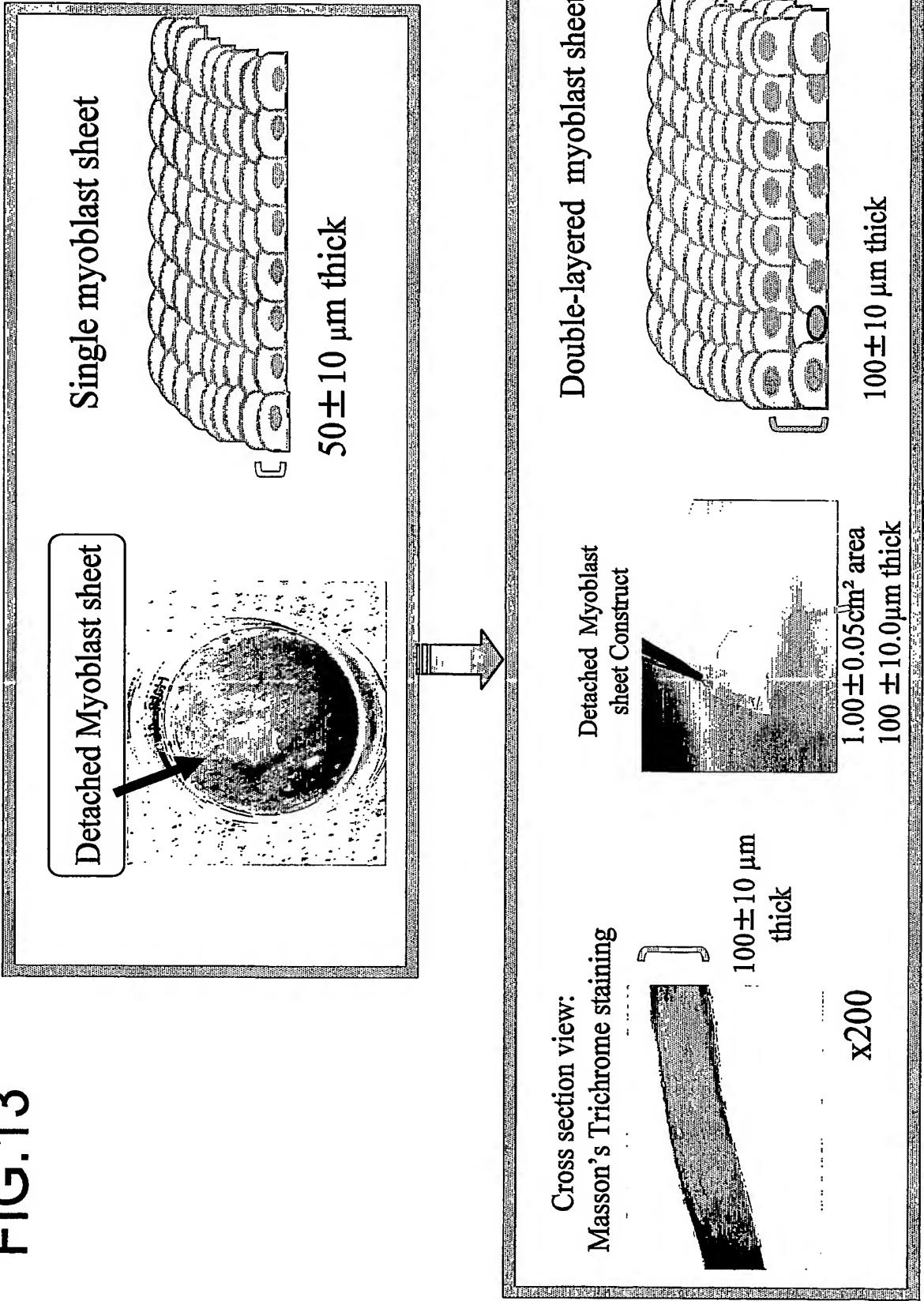
FIG.12

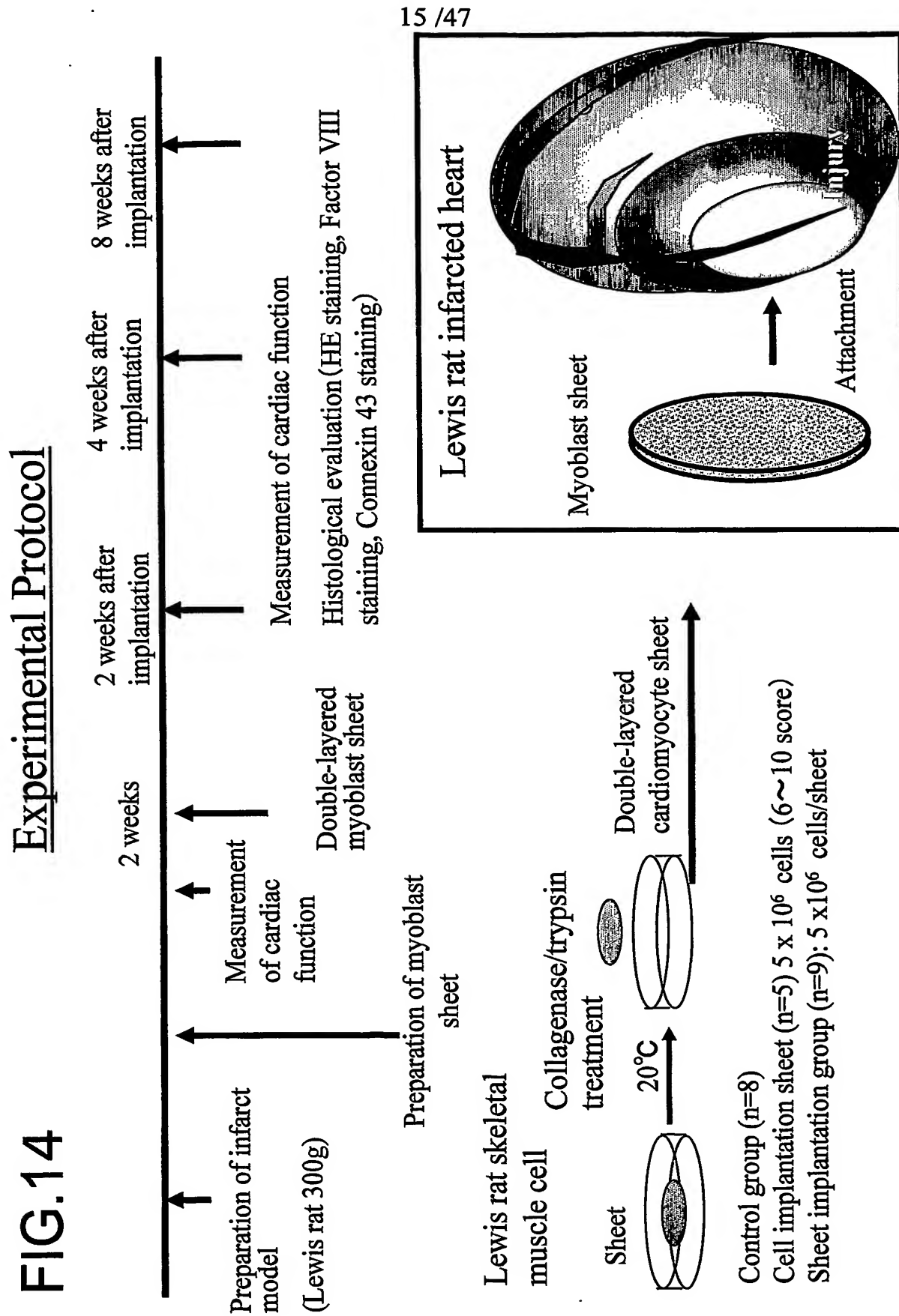
Isolation and culture of myoblast



Methods: Myoblast Sheet Construction

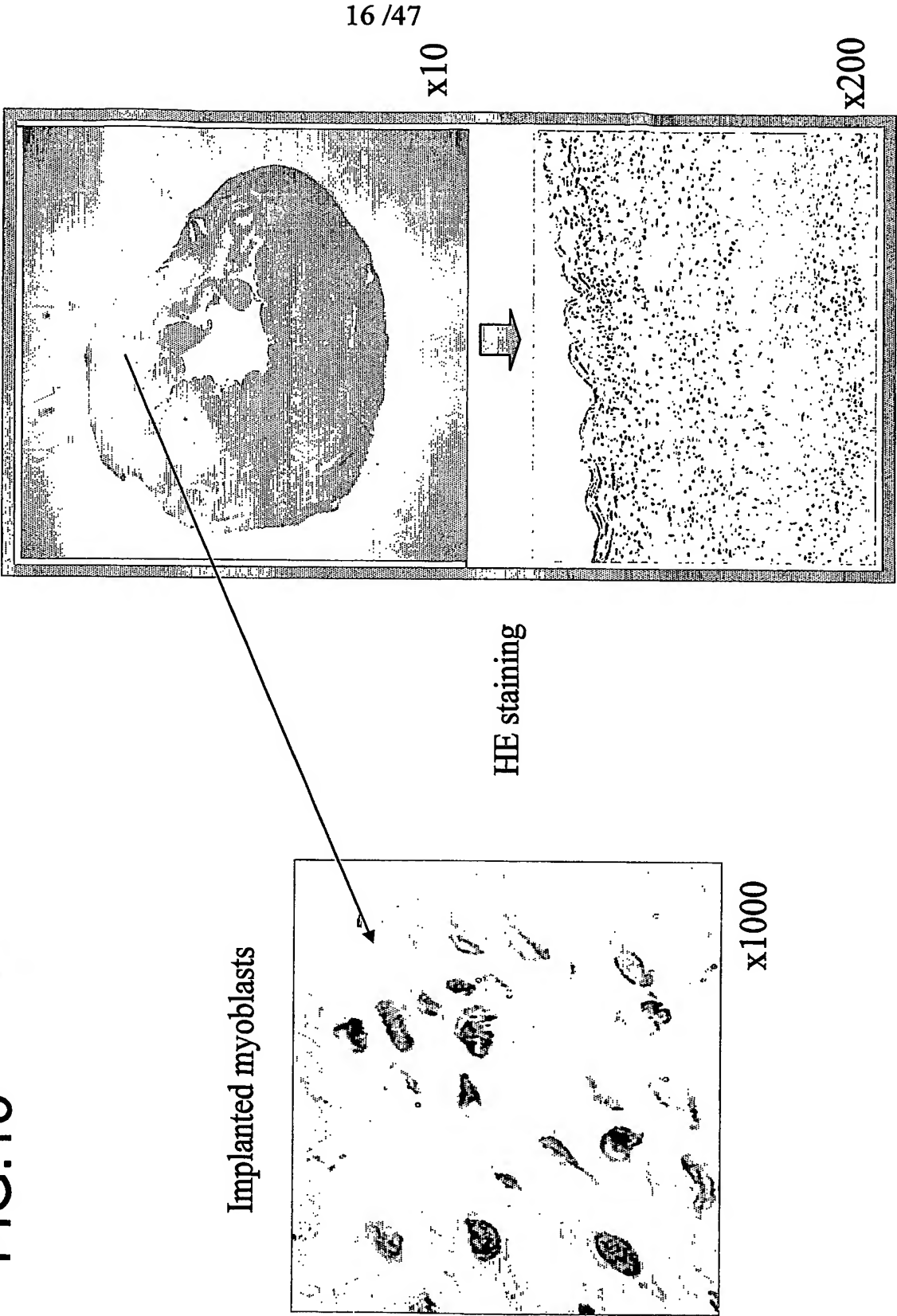
FIG.13





Myoblast sheet: 4W post implantation

FIG.15



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FIG. 16 Myoblast sheet Implantation procedure

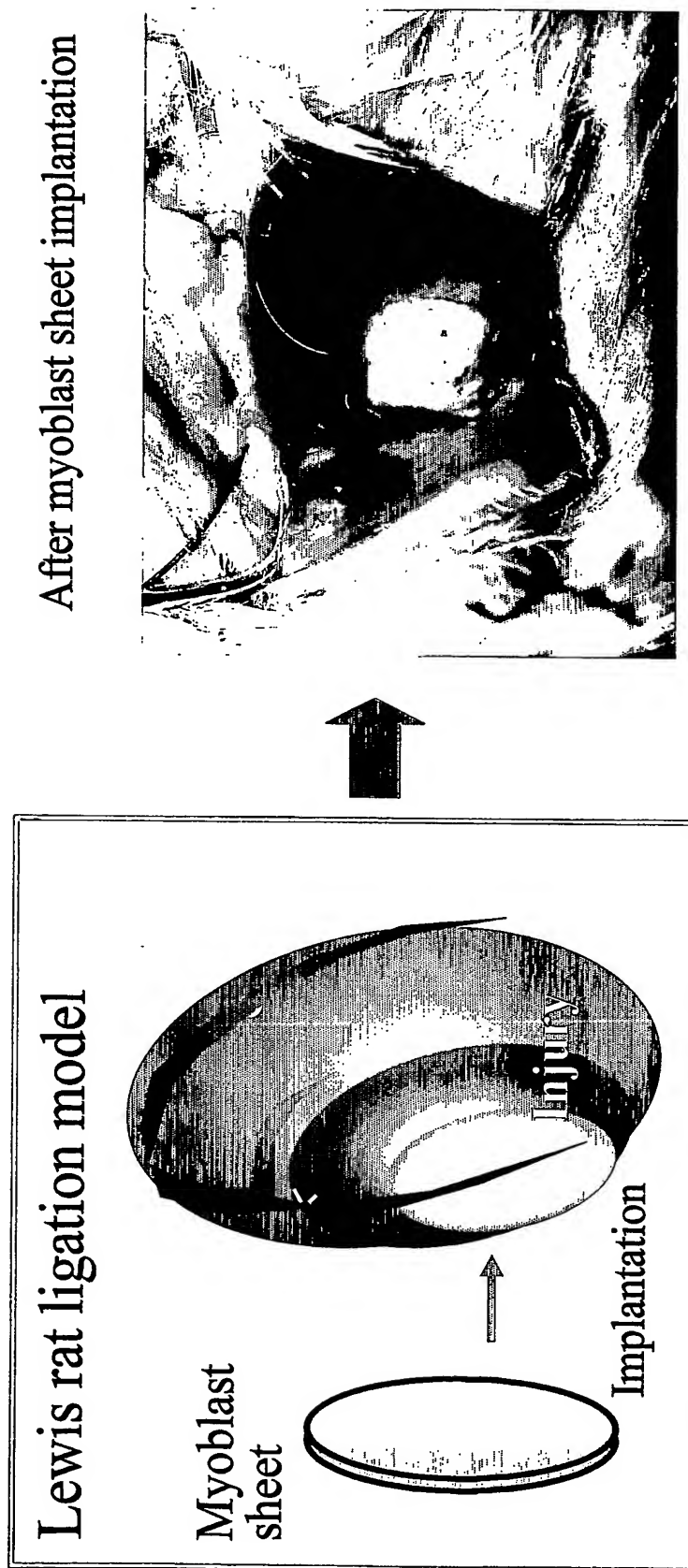


FIG.17 HistologyMasson's Trichrome staining

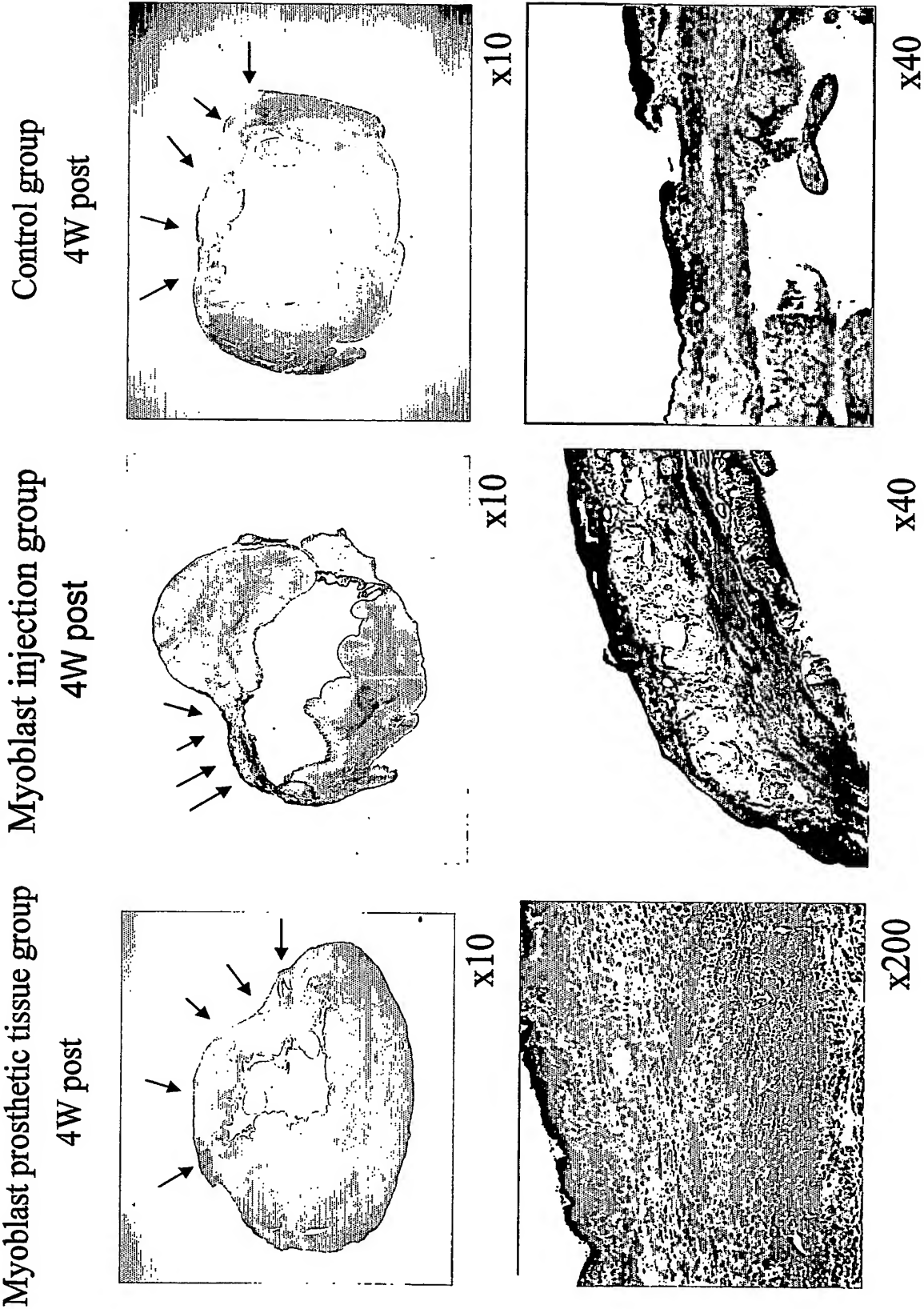
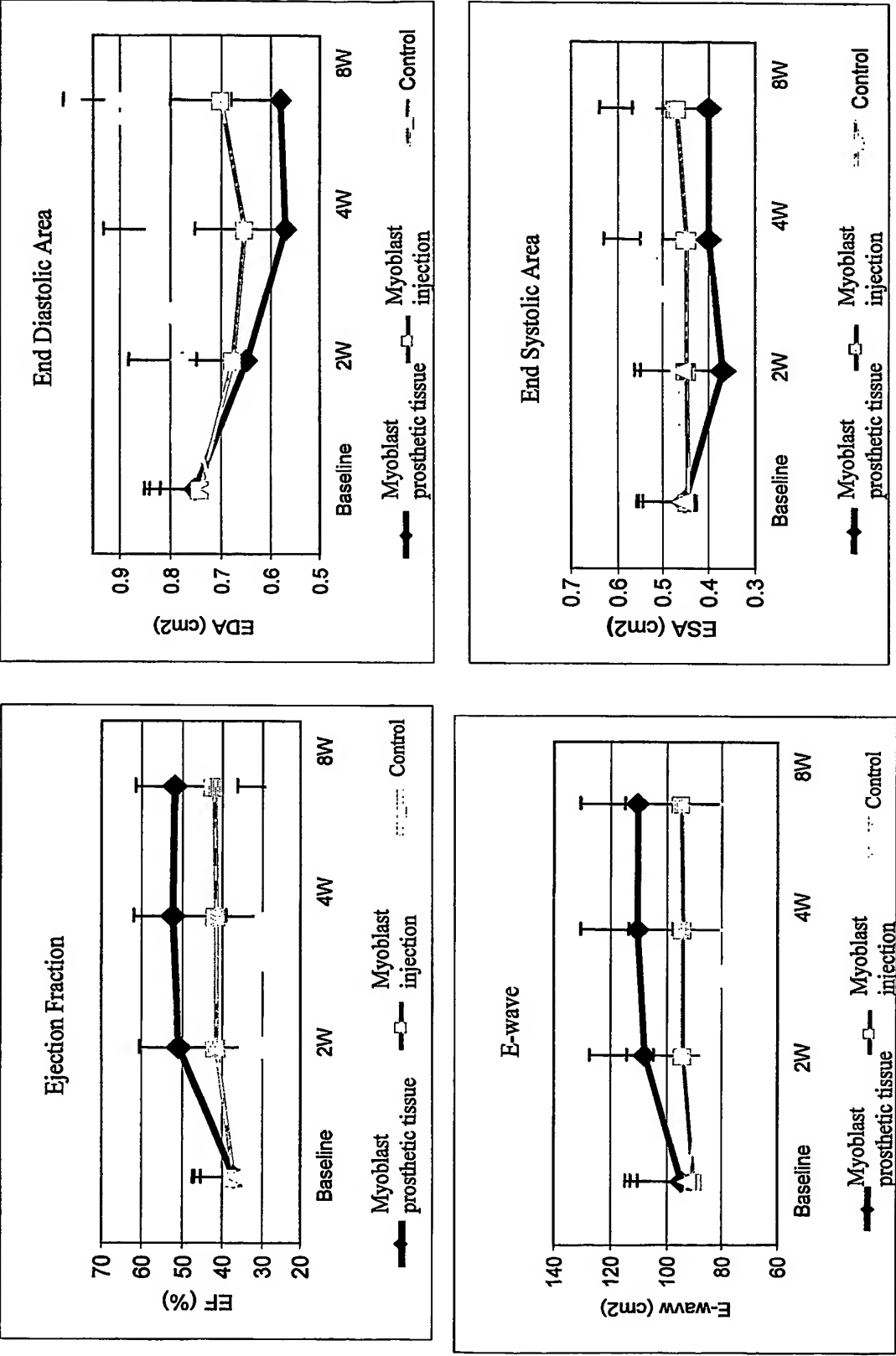


FIG.19



#P< 0.05 for control; *P<0.05 to for injection needle group

FIG.20

Anterior Wall Thickness Comparison

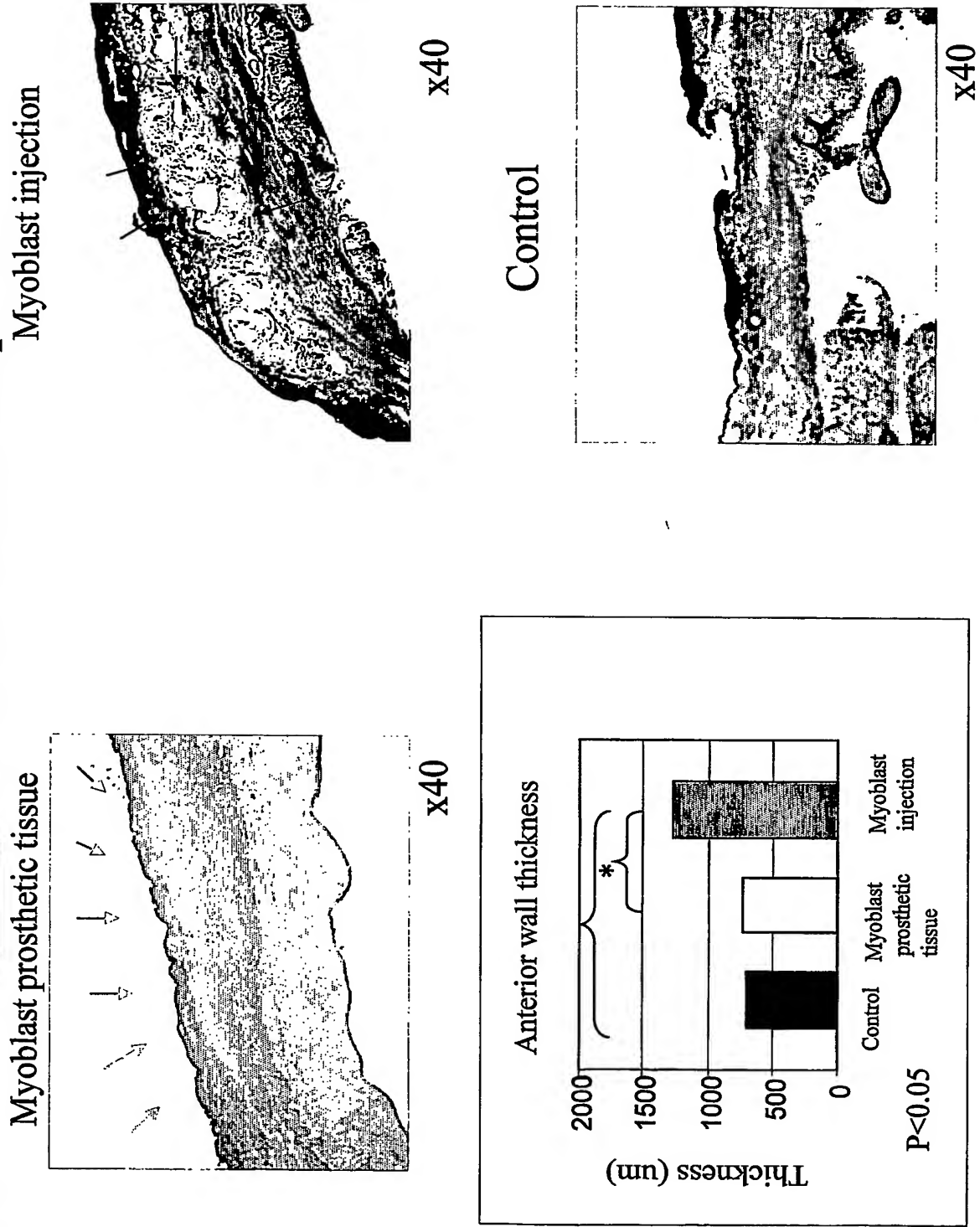
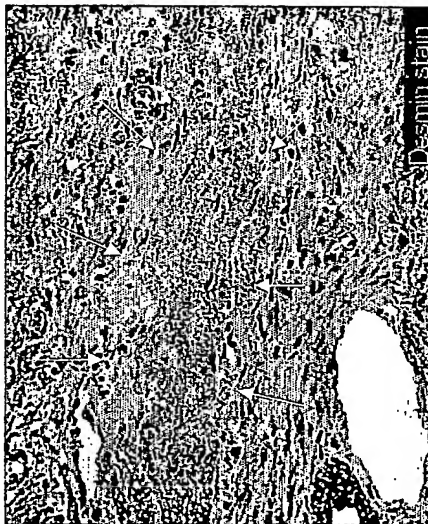


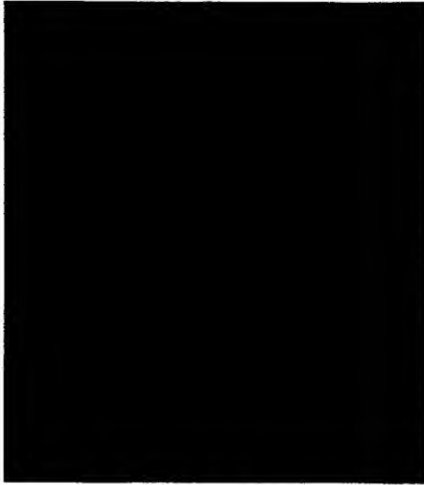
FIG.21

Myoblast sheet:
Desmin Staining



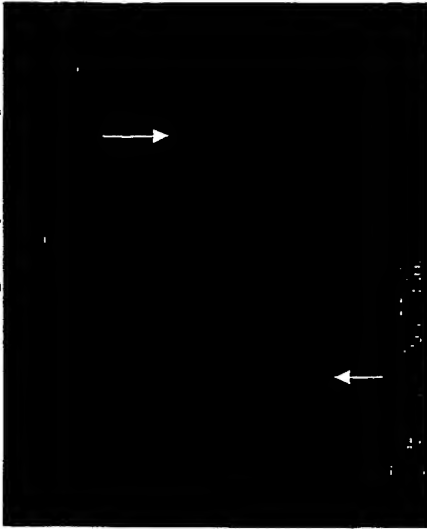
x100

Control group (GFP)



x100

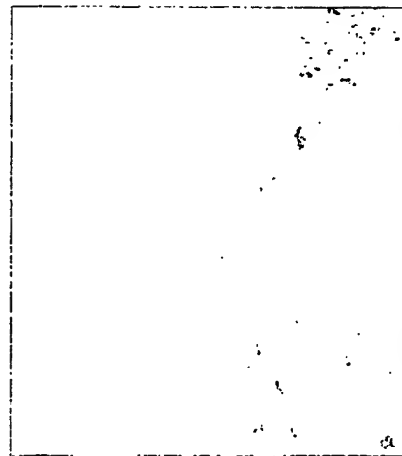
Myoblast prosthetic
tissue group (GFP)



x100
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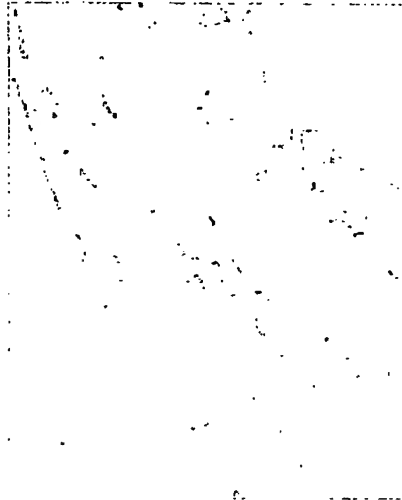
Factor VIII staining

Control



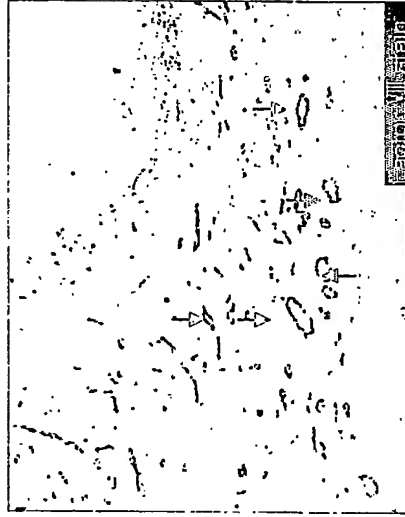
x40

Myoblast injection



x40

Myoblast prosthetic tissue



x40

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FIG.22A

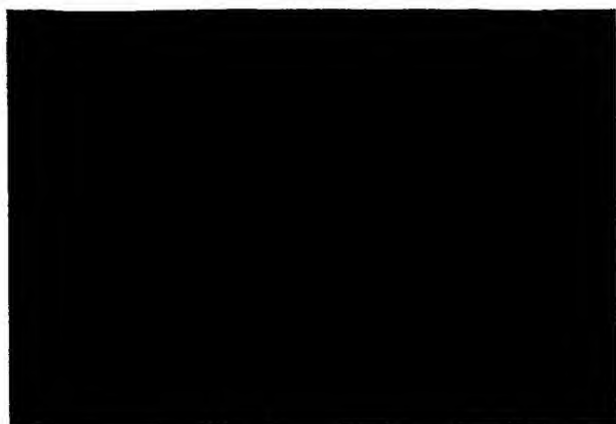


FIG.22B



FIG.22C

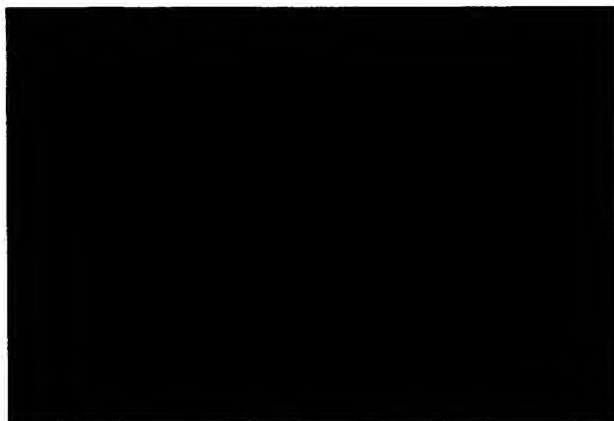


FIG.22D

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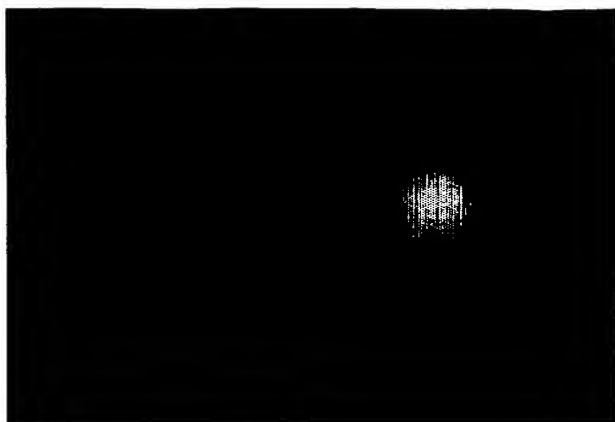


FIG.22E

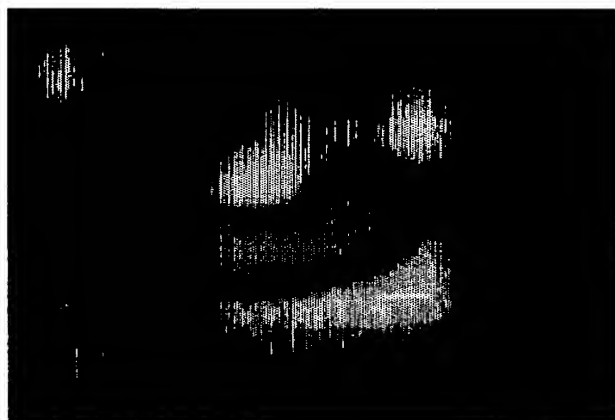
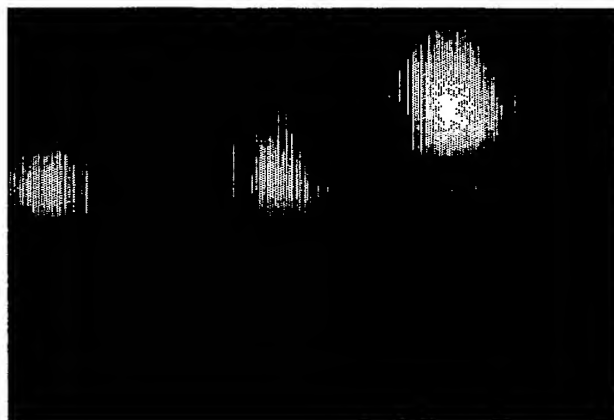


FIG.22F



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FIG.23A

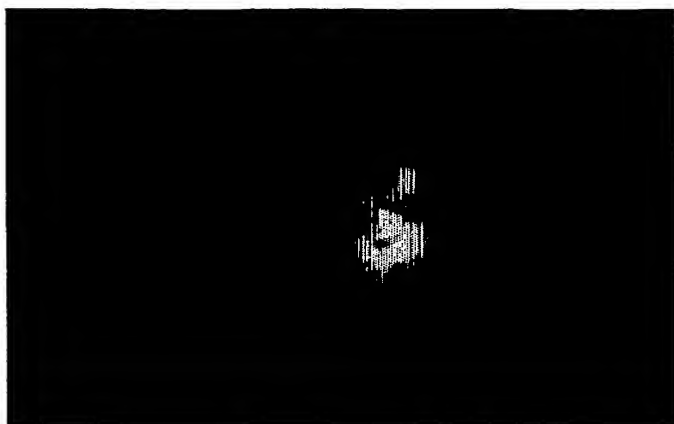
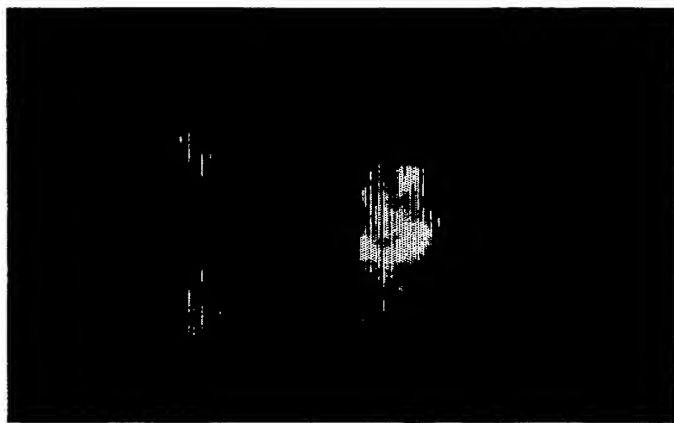


FIG.23B



FIG.23C



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FIG.24A

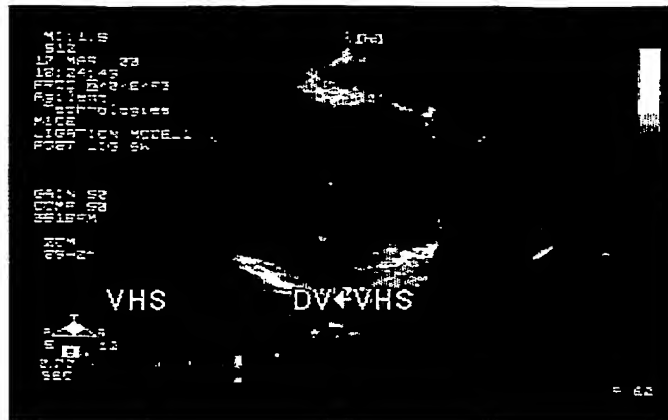


FIG.24B

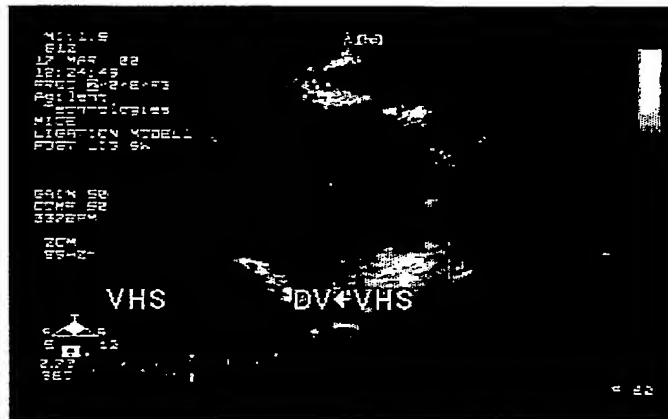
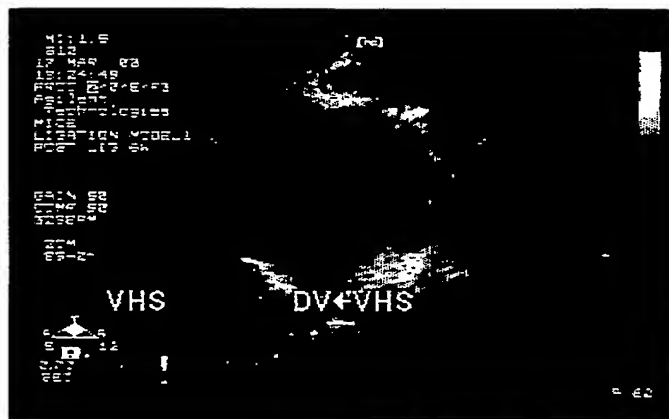


FIG.24C



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FIG.25A

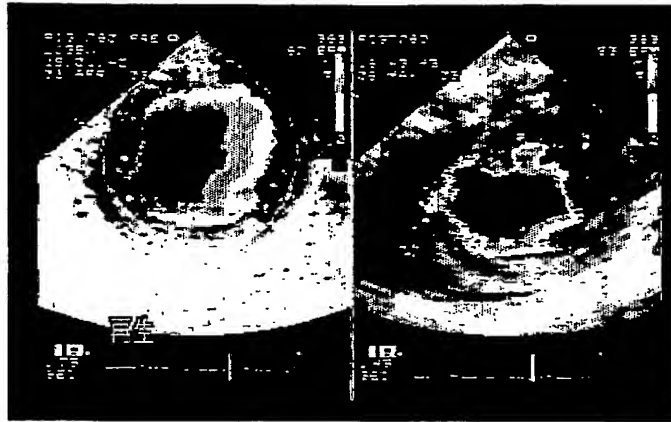
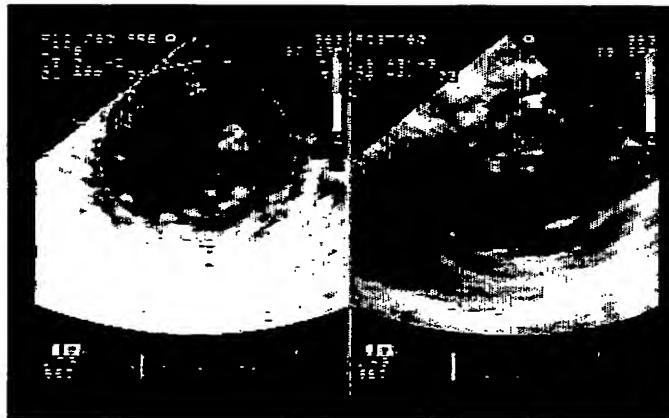


FIG.25B



FIG.25C



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FIG.26A



FIG.26B

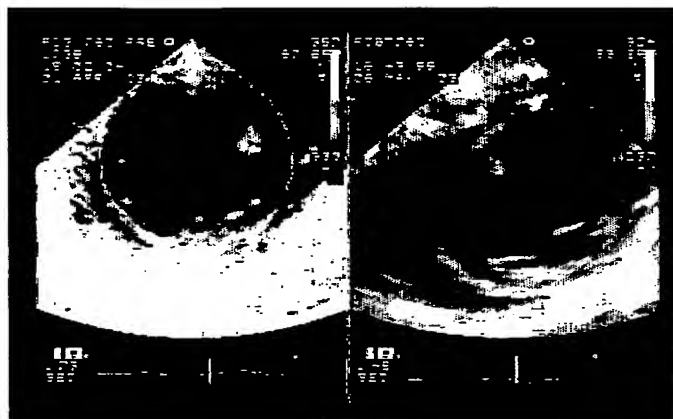
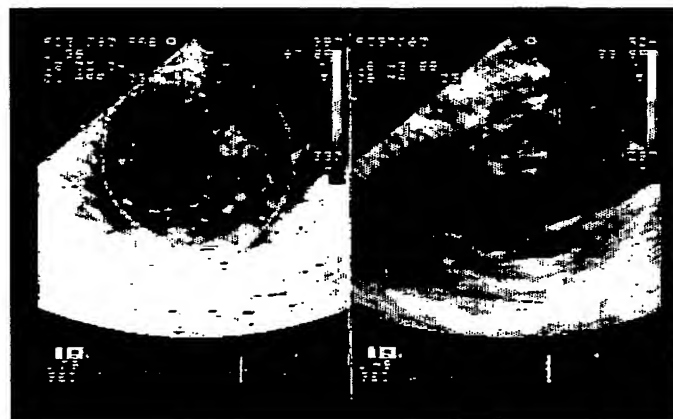


FIG.26C



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FIG.27A



FIG.27B



FIG.27C

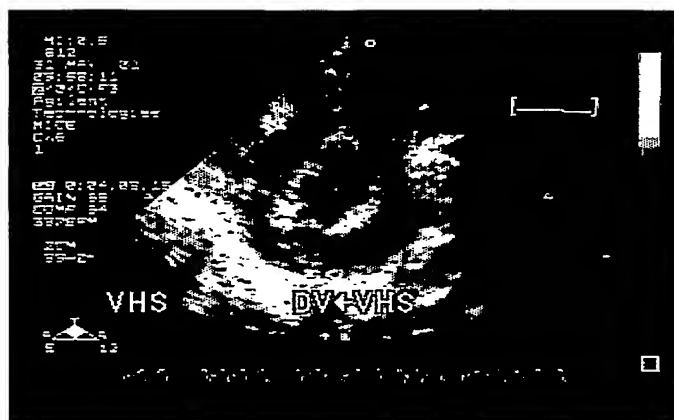


FIG.28

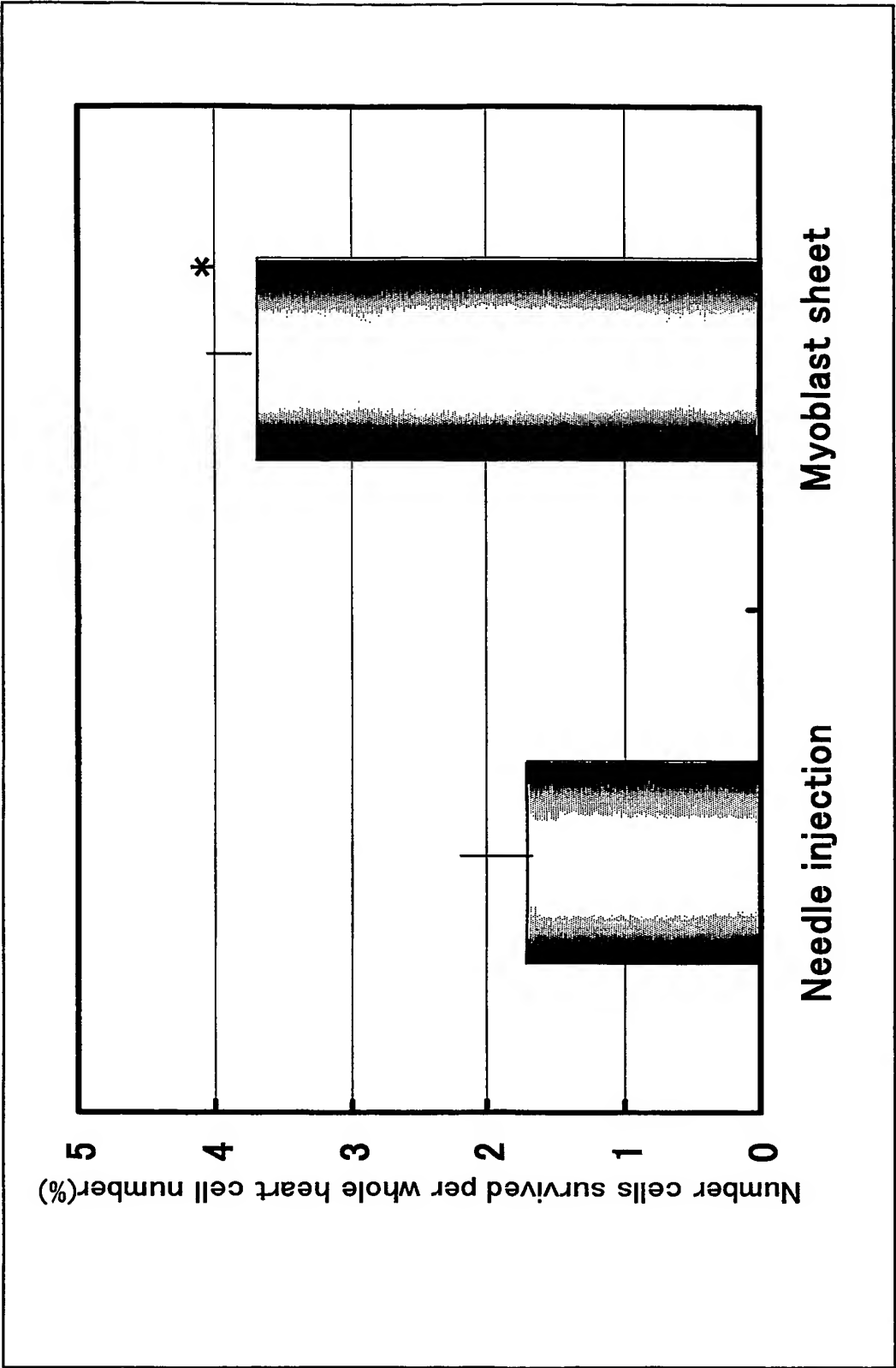
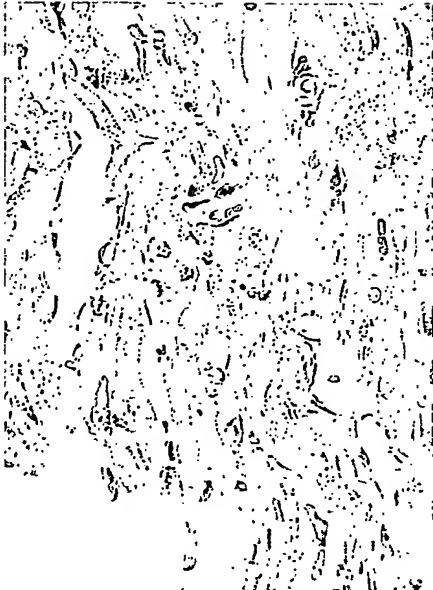


FIG.29

Masson's Trichrome staining x400



HE staining x400



MHC fast x400



MHC slow x400

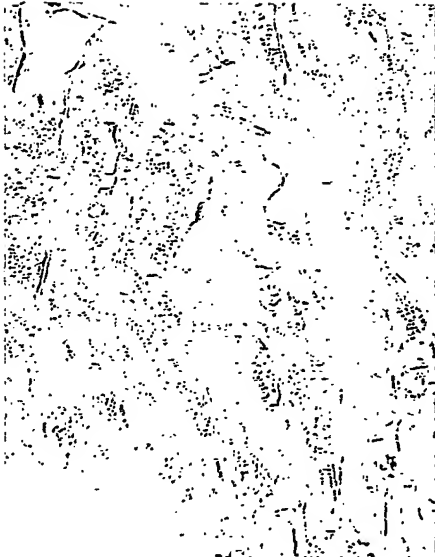


FIG.30A Tissue (Masson's Trichrome staining)

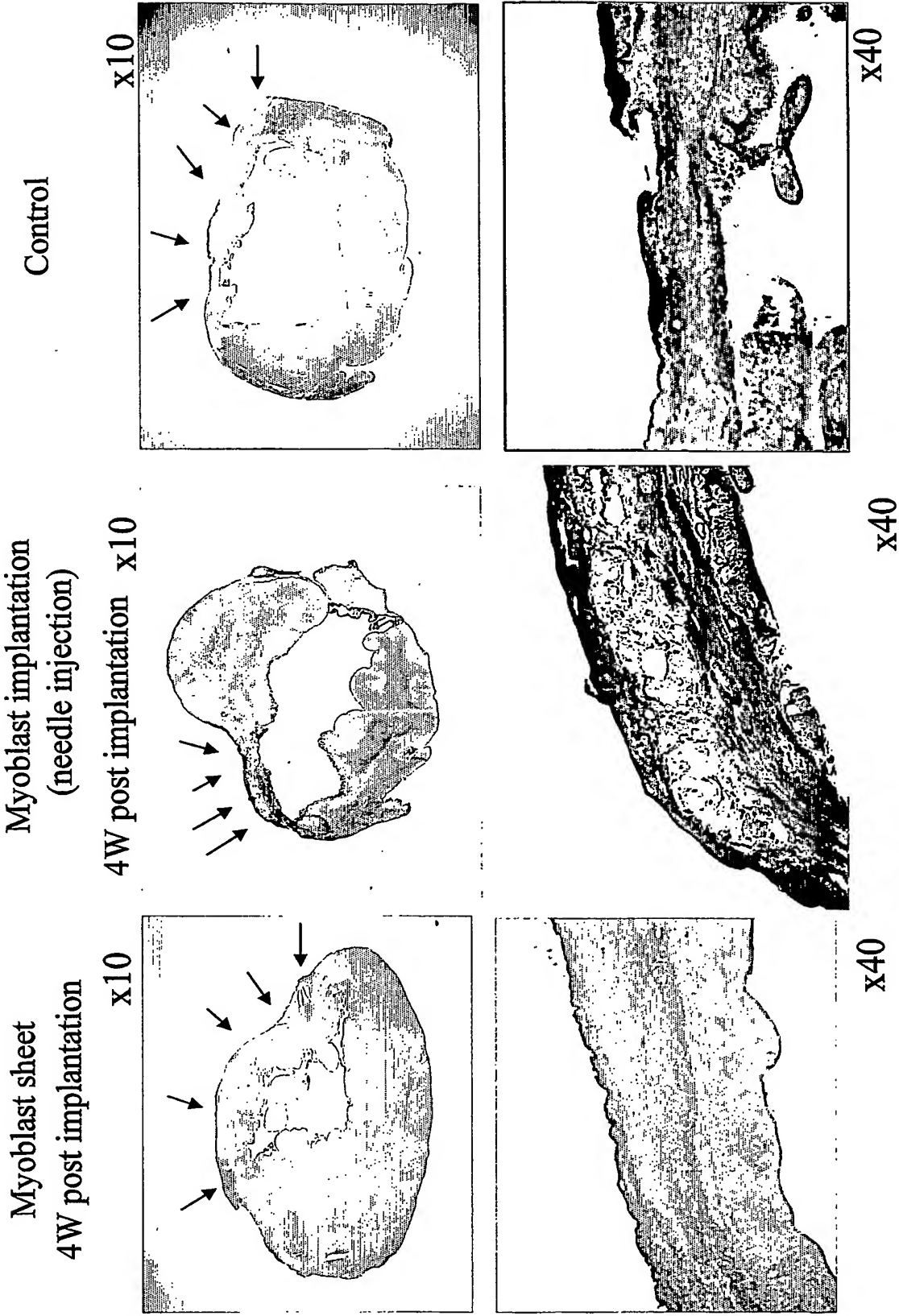
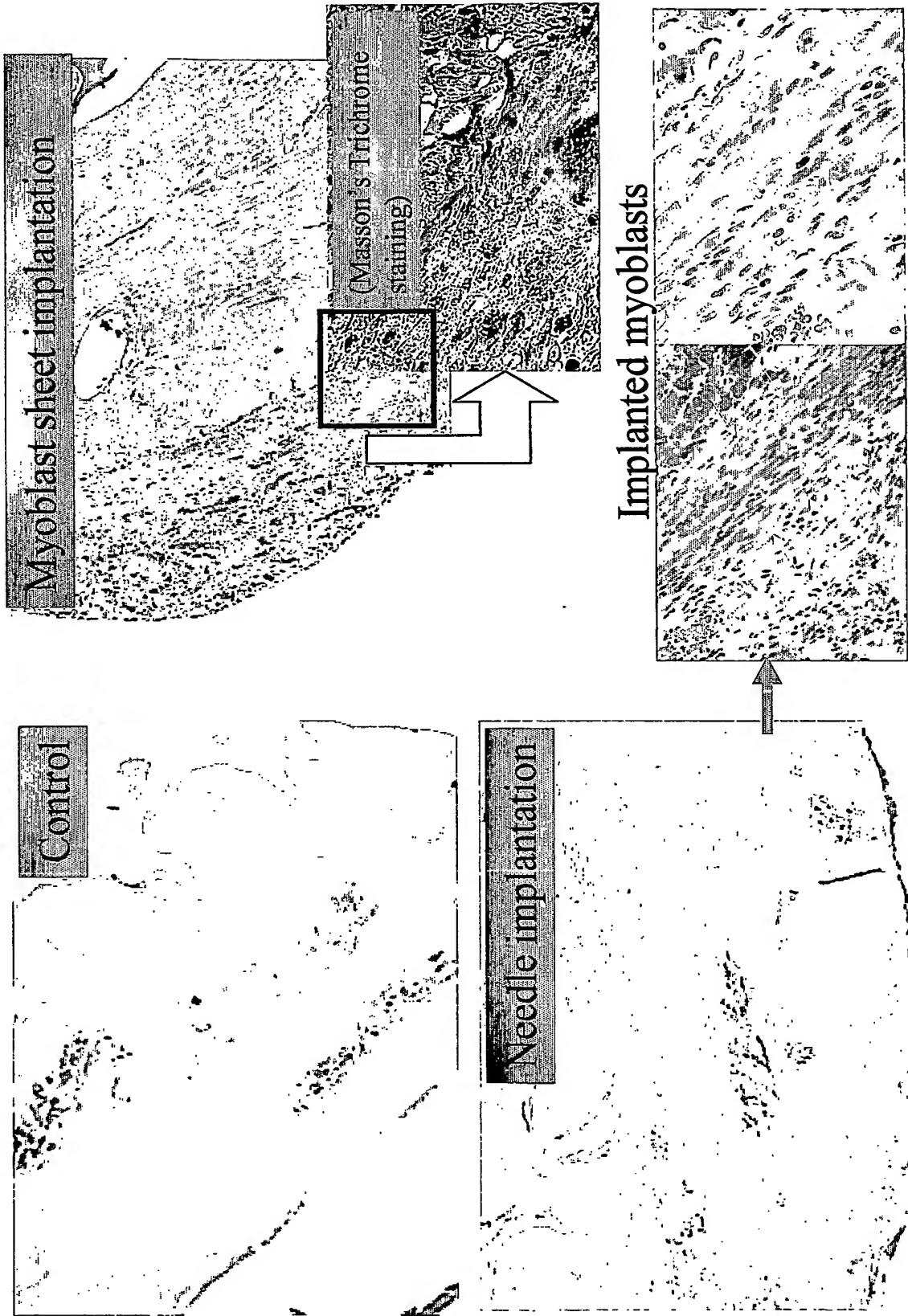


FIG.30B



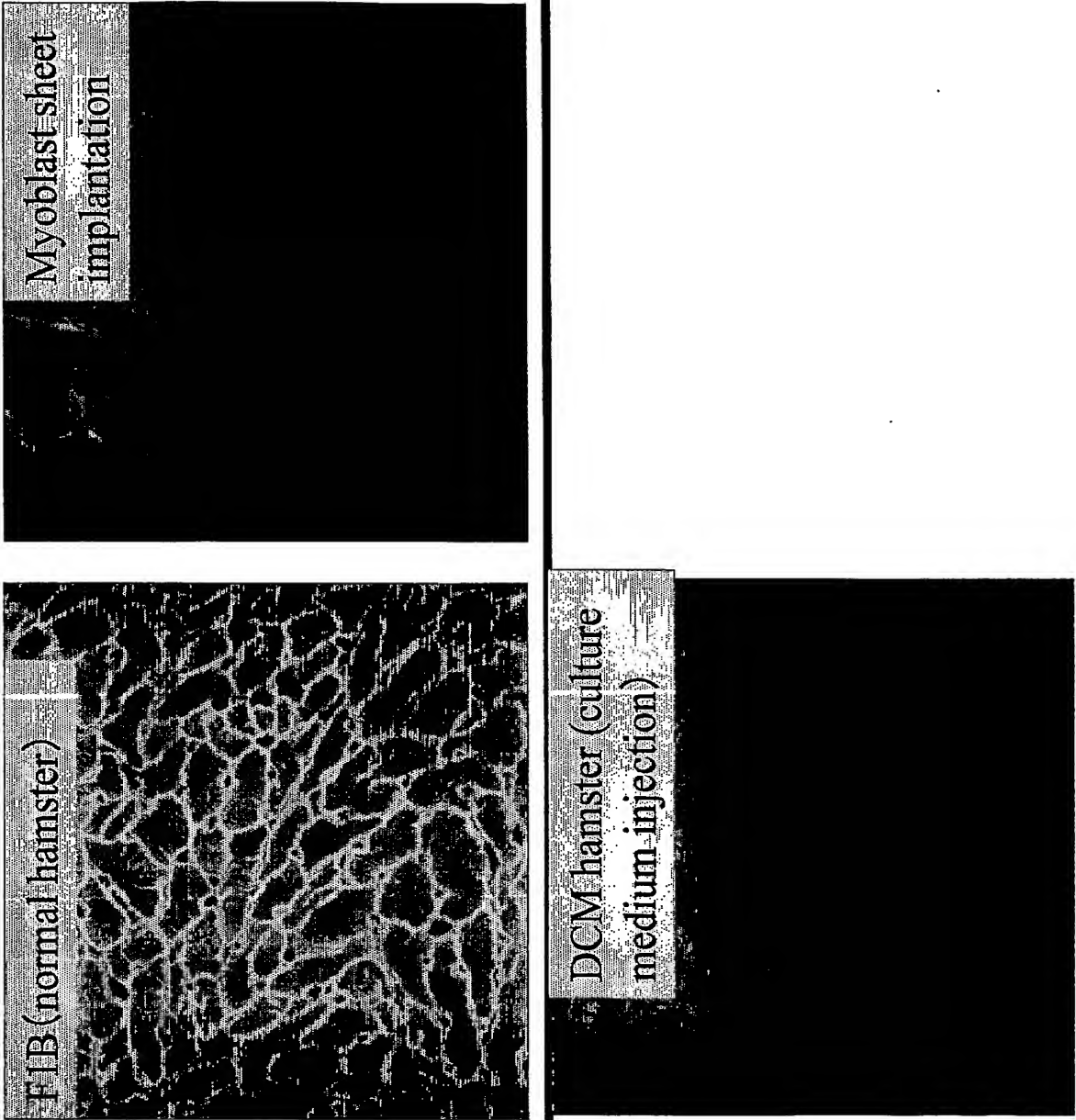


FIG.30C

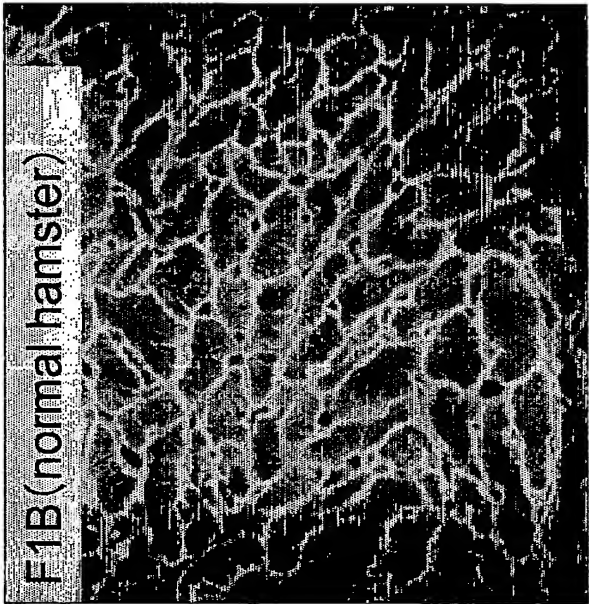


FIG.30D

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Survival rate of implanted cell

FIG.31

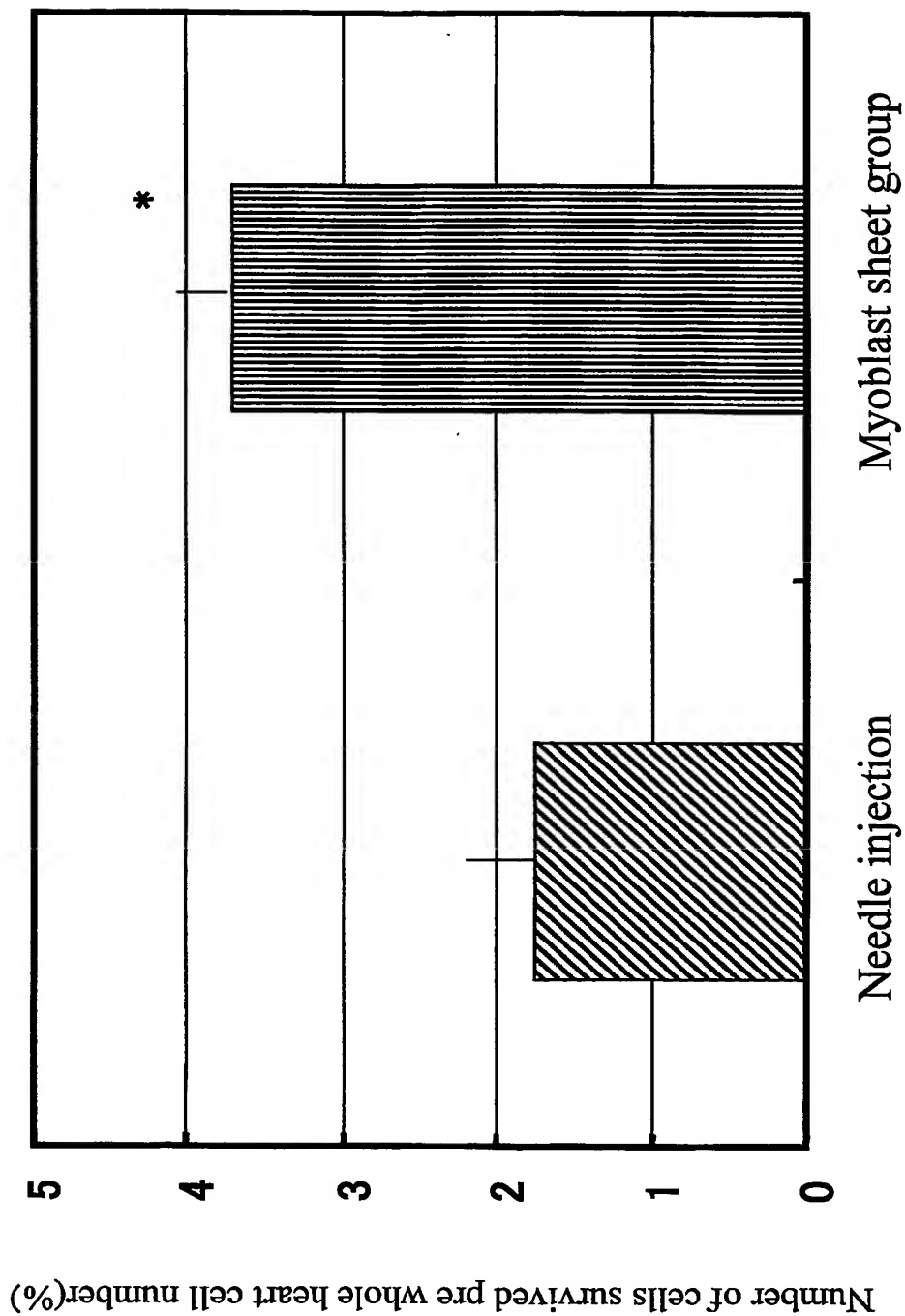


FIG.33A Myoblast sheet implantation to dilated
cardiomyopathic hamster

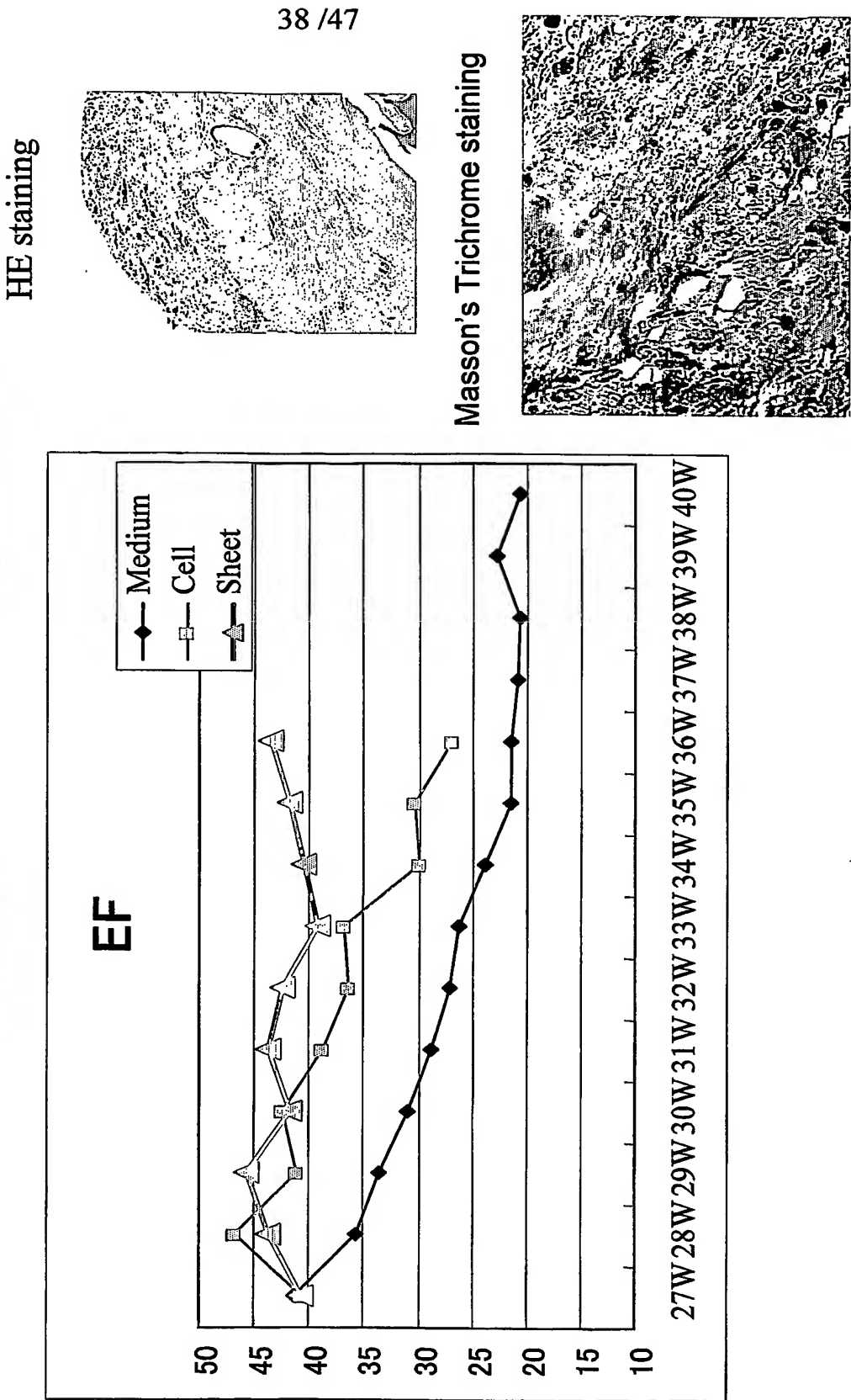
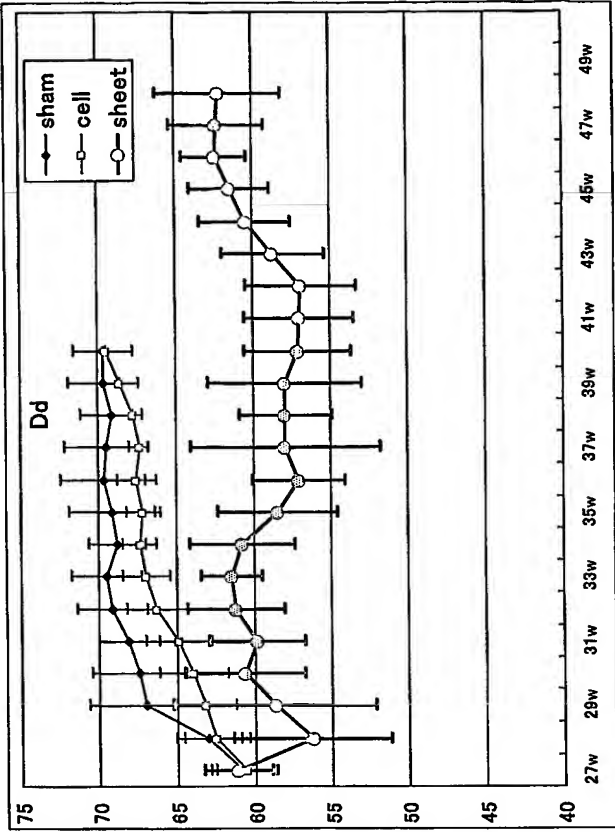
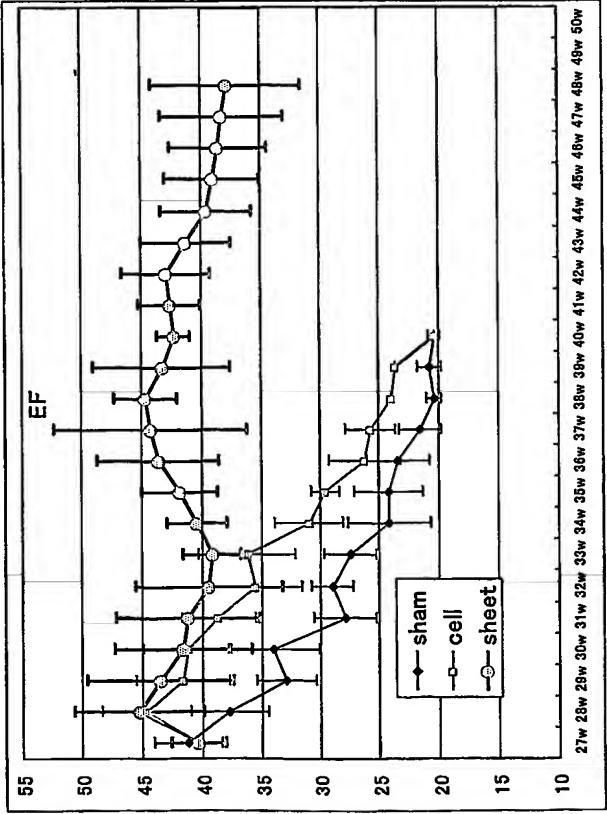


FIG.33B

Left ventricular end-systolic diameter

Left ventricular end-diastolic diameter



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FIG.33C

Control group

Myoblast sheet implantation group

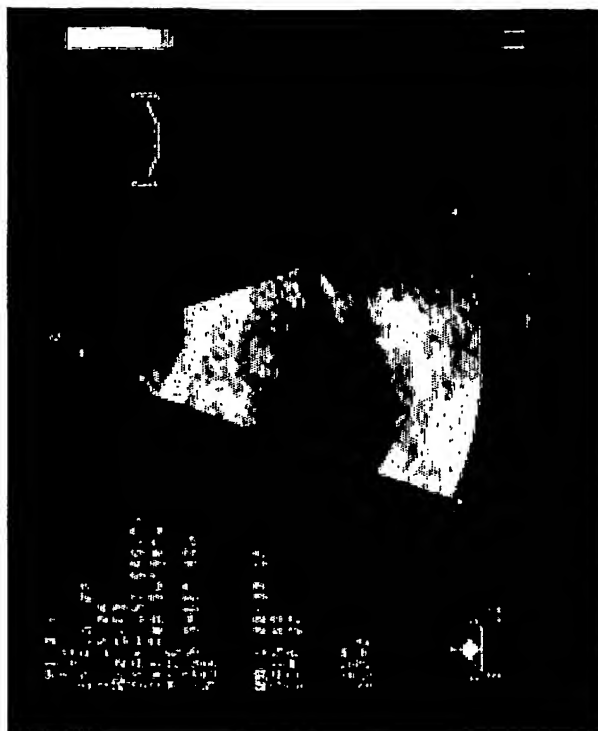
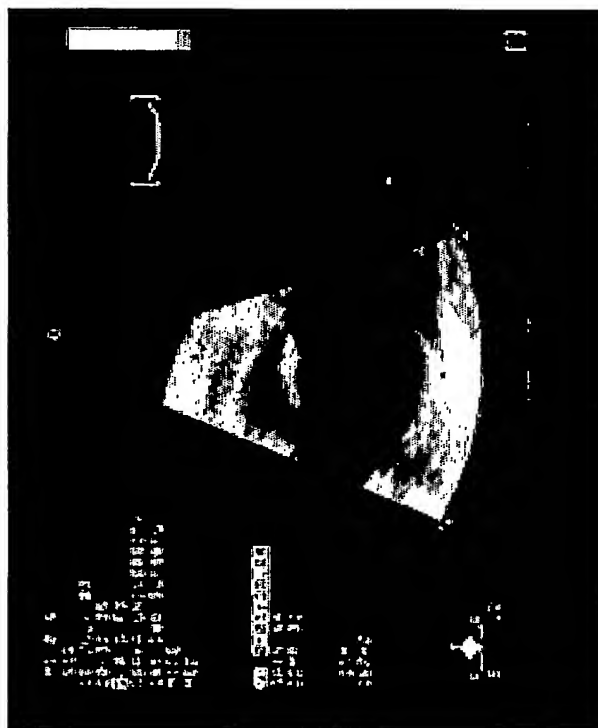
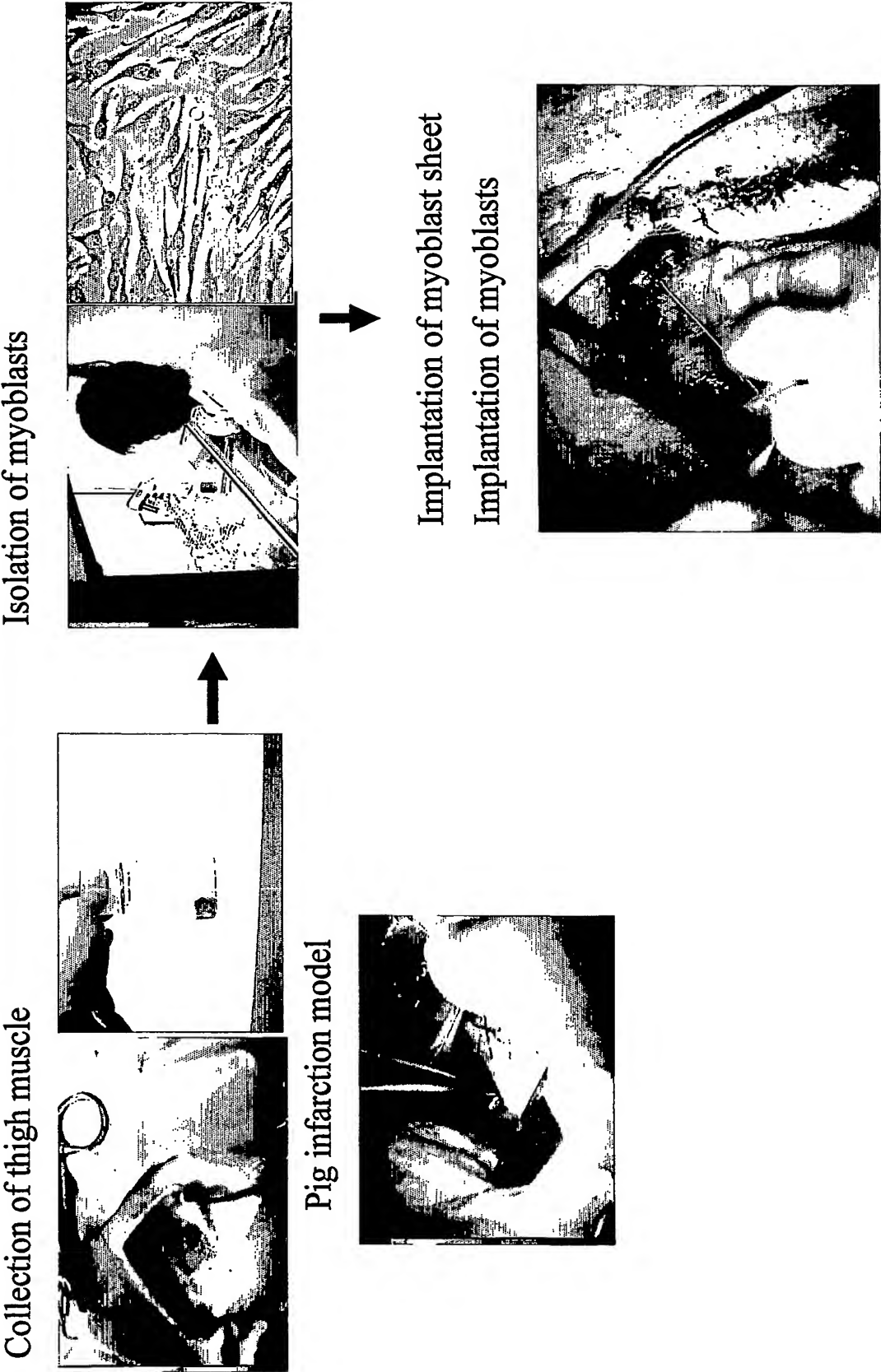


FIG.34 Myoblast sheet implantation into pig infarction model



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Evaluation of cardiac function (systolic function) of
pig infarction model by CKI method

Before operation After operation

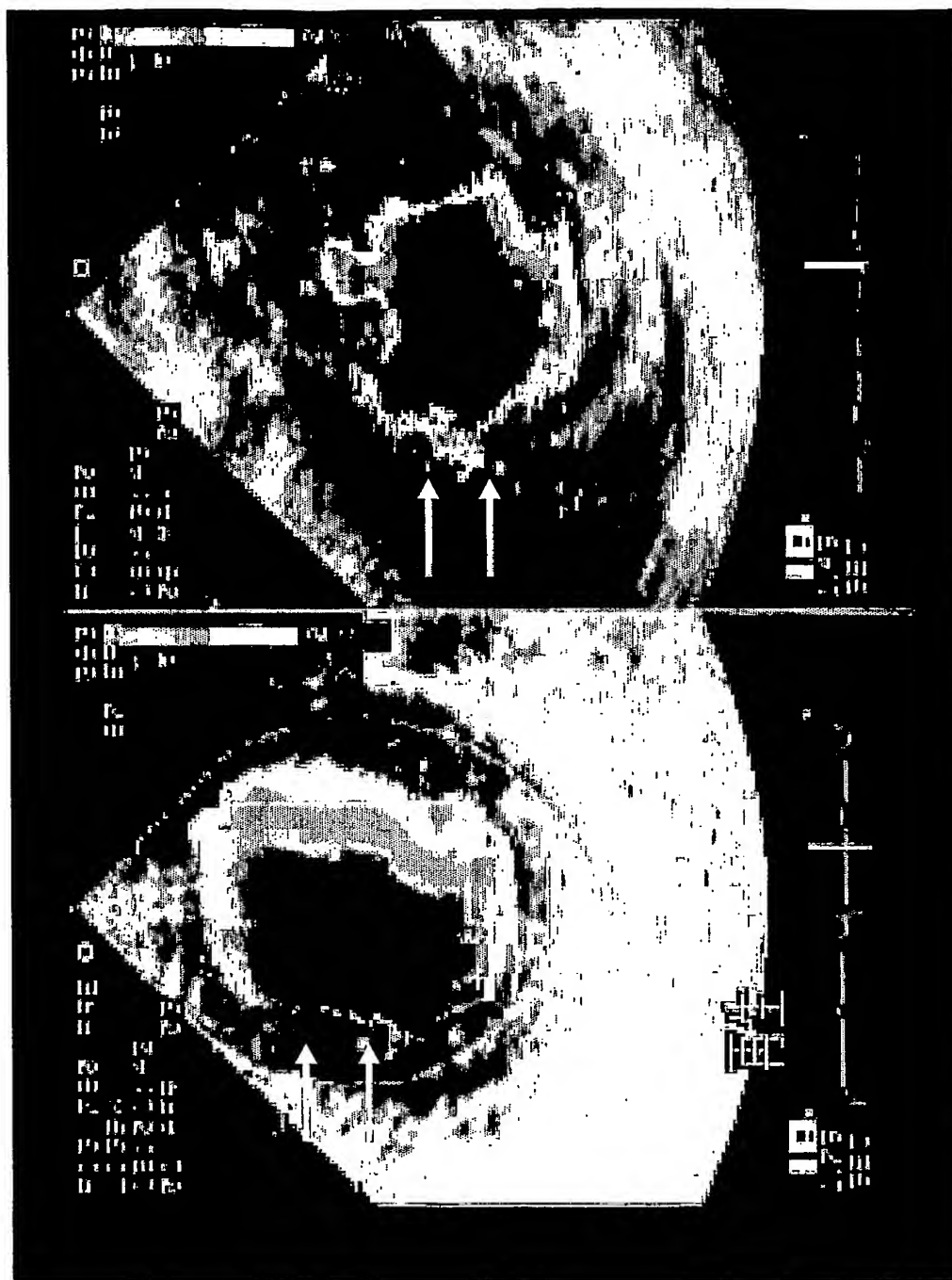
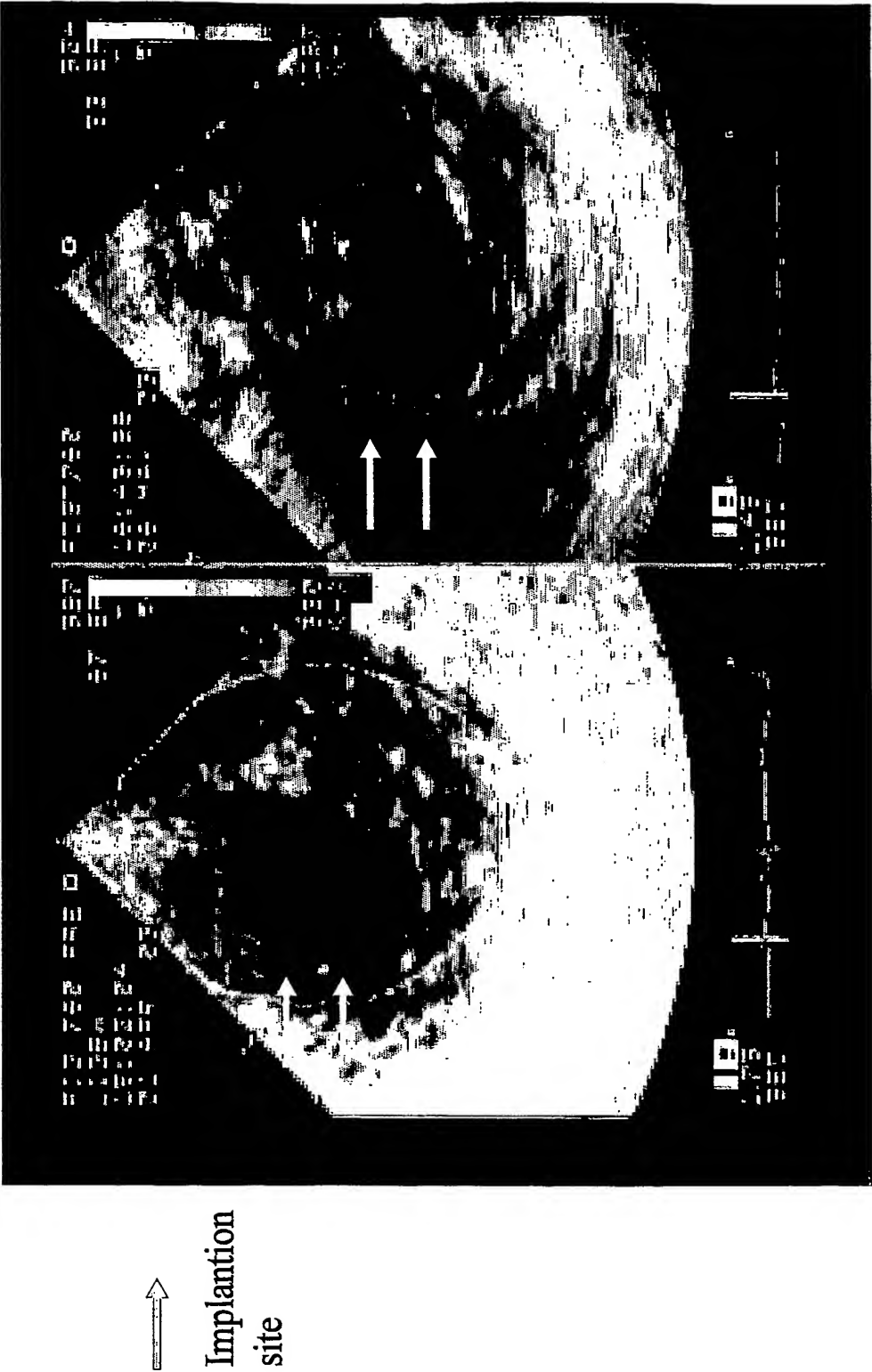


FIG.36
Evaluation of cardiac function (diastolic function) of
pig infarction model by CKI method
Before operation After operation



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FIG.37

Without ascorbic acid



FIG.38

With ascorbic acid

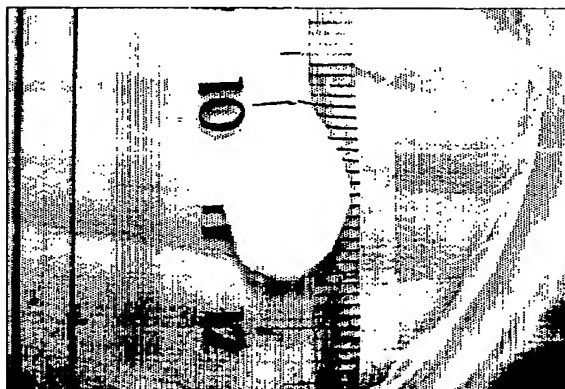
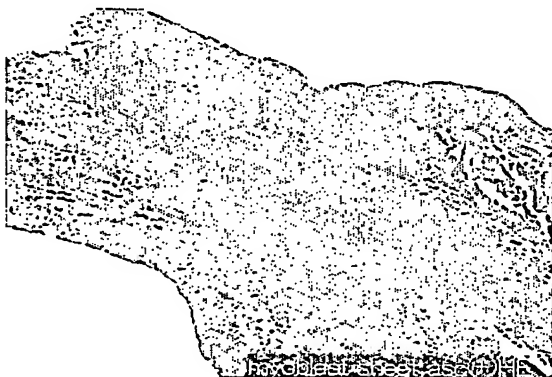
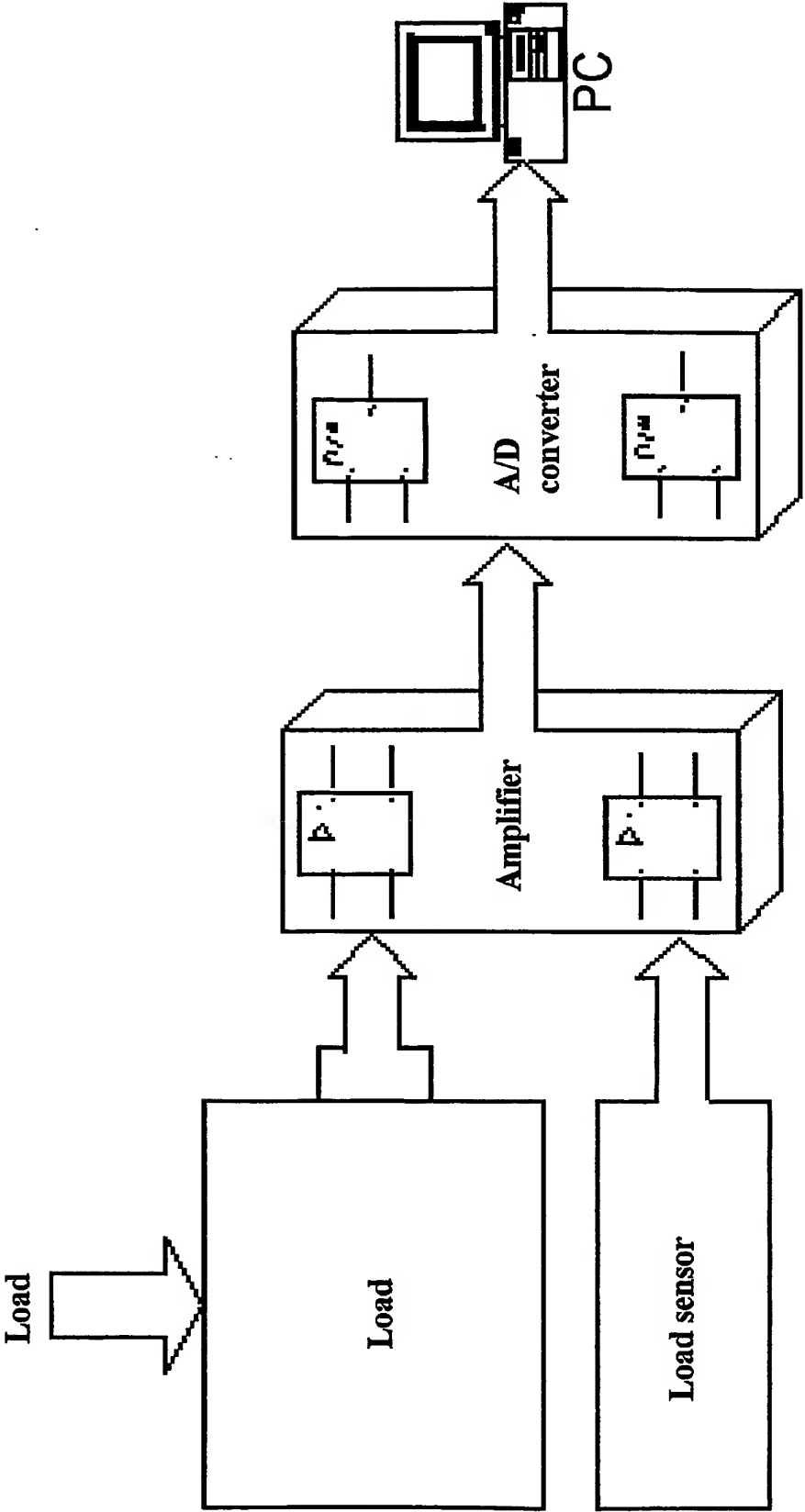


FIG.39



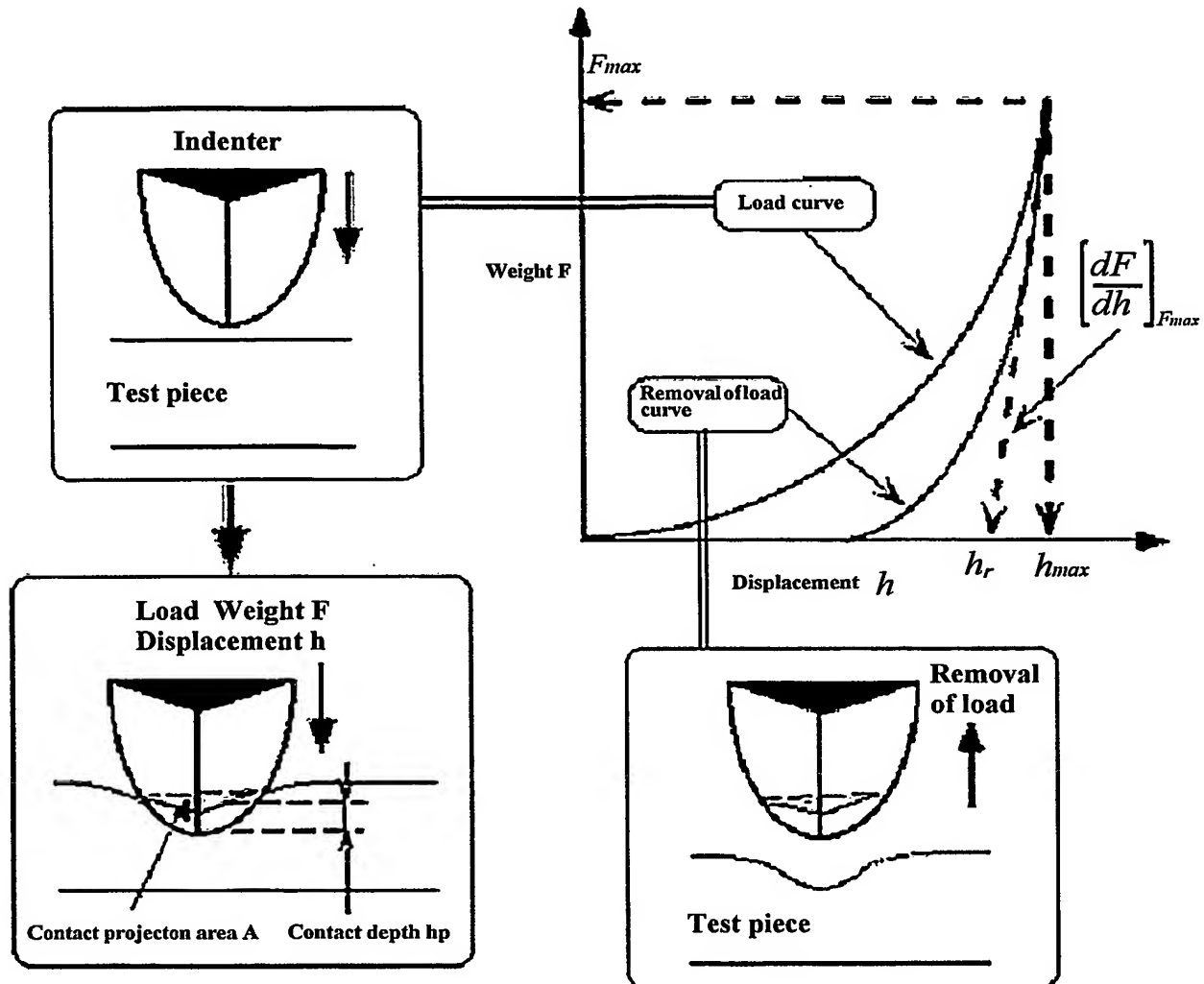
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FIG.40



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FIG.41



Rigidity $H = \frac{F}{A} = \frac{F}{k_1 h_p^2}$

Young's modulus $E = \left[\frac{dF}{dh}\right]_{F_{max}} \frac{1 - \nu^2}{2 \cdot k_2 \cdot h_{pmax}}$

Contact depth $h_p = h_r + 0.25(h_{max} - h_r)$

 F : Load A : Contact projection area h_p : Contact depth $k_1 k_2$: Shape coefficient F_{max} : Maximum load h_{max} : Max. displacement h_r : Point at which tangential line cross weight 0 dF/dh : Gradient of tangential line of the removal of load curve ν : Poisson's ratio

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FIG.42

